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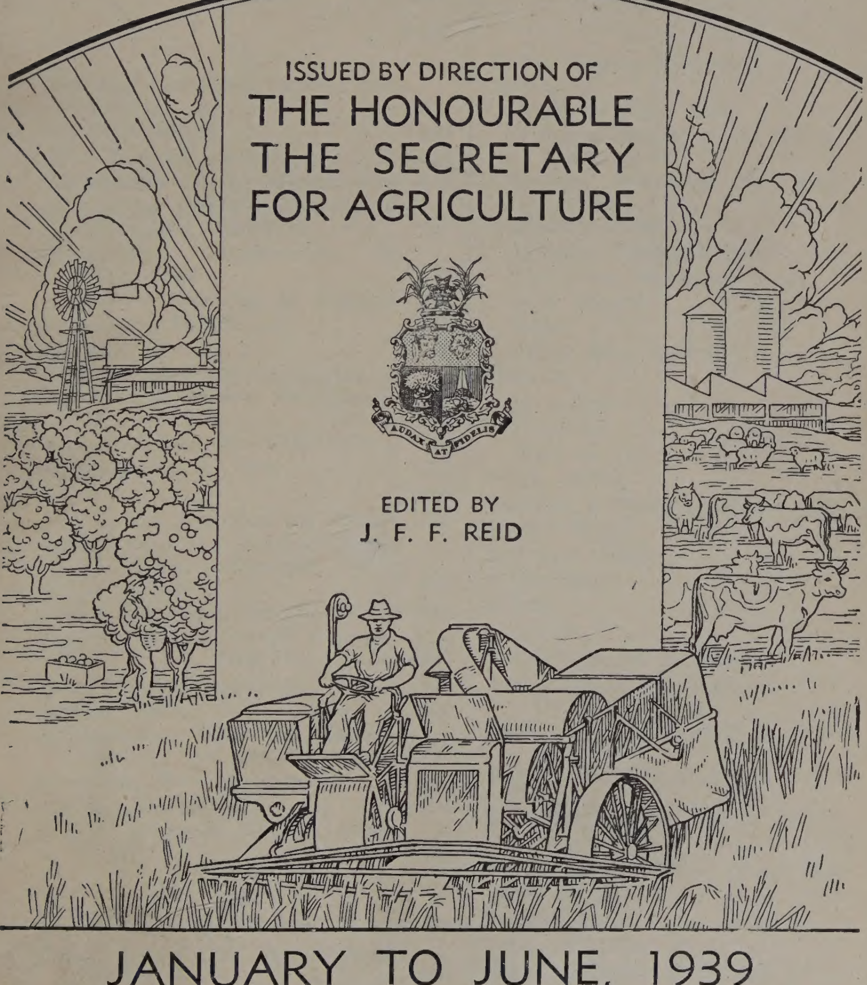

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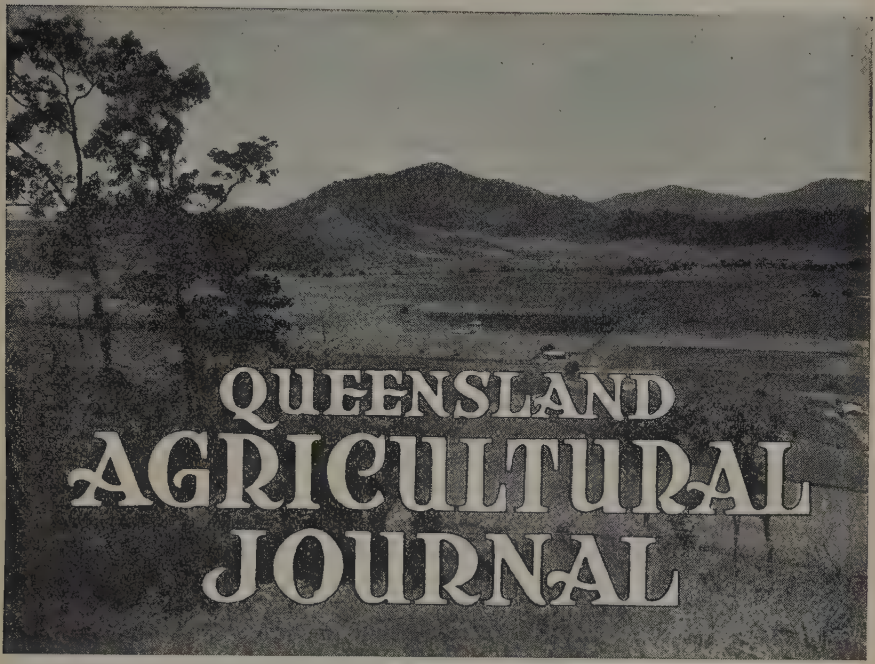

QUEENSLAND AGRICULTURAL JOURNAL

Vol. LI. 1 JANUARY, 1939 Part 1

Event and Comment

The Year's Progress—A Review and a Prophecy.

REVIEWING 1938 as a year of progress in Queensland, the Premier, Hon. W. Forgan Smith, LL.D., said that production in all branches of industry reached the highest figures and the volume of employment was greater than at any other period in the history of the State.

The estimated national income of Queensland had risen from £94,978,000 in 1935-36 to £106,600,000 in 1937-38.

Estimates for 1937-38 were not yet complete in respect of the gross value of production, but on the preliminary figures it was anticipated that it would be about £61,000,000, as compared with £59,826,511 in 1936-37 and £54,301,016 in 1935-36.

The growth of employment was best indicated in the returns showing the contributors to the unemployment insurance fund. All persons of eighteen and over working under State awards must contribute to this fund. For the three months ended 31st October, 1938, there were 29,500 more contributors than during the same months in 1929, and 52,500 more than during the same period in 1931.

The latest returns from the Treasury indicate that the financial position of the State is highly satisfactory. Revenue for the six months ended 31st December, 1938, showed an increase of £689,035 over the corresponding period of the last financial year, the total receipts for the half-year being £8,298,945. The excess of expenditure over receipts was £884,784, compared with £1,250,720 at 31st December, 1937—an improvement of £365,936.

"Thus there is ground," added the Premier, "for the most confident outlook for Queensland in the year ahead."

Continuing, he said that in the last session of Parliament important legislation had been passed for the more effective development of the State by orderly planning and co-ordination.

Three complementary measures—the Rural Development Act, the State Development and Public Works Organisation Act, and the Income (State Development) Tax Act—empowered the Government to give effect to its policy. A cardinal principle of that policy was to increase opportunities for full-time employment at award rates for the greatest possible number.

The Government was aware that it could not accept the responsibility of finding full-time employment for all, but it was conscious of the importance of leading the way, and, by making the best use of available resources, of stimulating general employment.

The first step was to plan for the progressive abolition of intermittent relief work. A thorough survey was made before a line of action was defined. Everybody knew that the system of relief was uneconomic, and, while it offered a temporary escape from the worst effects of unemployment, it was a hopeless substitute for real work.

The survey convinced the Government that intermittent relief work had to go, and the Government proceeded to end it. At the outset there was a great deal of criticism—most of it ill-informed—of the new scheme, but results have proved its soundness.

"It is gratifying to me," remarked the Premier, "to be able to say that the conclusions formed from the survey of the position have been more than justified by subsequent events."

He went on to say that while employment figures had been steadily rising since 1932, the additional impetus given by the Government's drive since 19th September, 1938, added 3,067 to the number to the end of the year. By the end of March of this year 4,071 men, hitherto on intermittent relief work, will have been given direct employment. Of the number of unemployed called up to 31st December, 1938, 1,342 had already found work. It was estimated that for every 1,000 men given direct employment 610 others were indirectly employed. Therefore, as a result of this scheme, more than 8,500 men will have obtained full-time work by the end of March next.

He called particular attention to this full-time work restoration scheme, because so much hinged on its success. There could be no gainsaying the beneficial economic effect on the State of the re-employment of so many workers who had previously lived precariously by intermittent relief work. Private industry was stimulated by the increased purchasing power of those workers; a demand was created for materials and equipment; systematic work of a permanent character was done under competent supervision; and the national assets were increased. But above all was the effect on the workers themselves. Thousands who had previously felt the pinch of want, mitigated only to a small extent by relief pay, were now enjoying good regular food, living under healthy conditions in road and forestry camps, regaining their physical powers, and rejoicing in the knowledge that, at last, they were doing men's jobs.

In the promotion of this employment drive local authorities and private employers could play a big part, and he believed they would when they appreciated what it meant in the welfare of all.

An important factor in the development of the State was the provision of first-class roads. In this Queensland had done excellent work. In the North roads must stand up to the most trying conditions; yet gradually all-weather roads were reaching out. In other parts of the State the work was going steadily on. With the inauguration of the full-time work plan, road construction was pushed ahead vigorously, and by the end of 1938 5,700 men were employed by the Main Roads Commission, apart from 1,025 engaged by the Public Estate Improvement Branch.

The importance of this work from the point of view of national defence was obvious. The more first-class roads there were, the more mobile would be the defence force.

What of the future? The Premier believed that, provided our national life was not disturbed by circumstances beyond our control, we should go forward steadily with the development of our rich heritage, and build a healthy, happy, and self-reliant community.

Development of the Dairy Industry.

IN the course of a survey of rural progress in the State, the Minister for Agriculture and Stock, Hon. Frank W. Bulcock, placed especial emphasis on the remarkable development of the dairy industry. He said that possibly more research and investigation had been undertaken on behalf of the dairying industry than for any other branch of agriculture.

First came the holding. It must be capable of carrying a herd, possess a good, clean water supply, and preferably have sufficient arable land to allow for the growing of fodder crops.

Reliance had to be placed almost exclusively on introduced pastures. The grasses of prime importance were paspalum and Rhodes grass, but other grasses were being added rapidly to dairy-land pastures.

At Gatton Agricultural College the Plants Introduction Division of the Council for Scientific and Industrial Research was trying out many new grasses, some of which would ultimately become standard in dairying areas.

In the far North, Para, Guinea, and molasses grasses were benefiting pastures immensely.

Further south, the State had been divided into a number of research and experimental areas, and a progressive grass policy was in process of establishment.

He feared, however, that the importance of this work was not yet fully understood, nor was our dependence on grass yet fully realised. The combined soil and climatic factors in the State had their counterpart in no other dairying country in the world; so it was necessary to open up new furrows in the field of pasture research.

The Minister's New Year Message

THE sun is about to set on the old year. Fears, alarms, and anxieties were closely linked to the days that have departed. One result of these dire things has been a weakening of the world's purchasing power and, at times, a sharp decline in the prices obtained for agricultural produce. It is evident that peace and stability go hand in hand; that wars and rumours of war destroy confidence; that for our continued progress peace is essential.

Many agricultural industries enter the New Year under the smile of a kindly Providence, and my earnest wish is that the New Year will bring that harmony and understanding upon which peace is based.

Given these, I feel sure we shall march forward to our destiny without dismay, prepared as ever to face and overcome difficulty and even disaster.

I thank the members of the agricultural community for the assistance they have given me during the past year. I feel that you, as producers, realise more and more that the Department of Agriculture and Stock is your Department, staffed and controlled to give you service.

Every one of our numerous officers is anxious to serve the cause of Agriculture, and I assure the Primary Producers of our State that it will be our constant endeavour to do those things, cultural, economic, and in the wide field of research, that will add to the security of our people.

My officers join with me in wishing you all a Bright and Prosperous 1939.

Frank. W. Bulcock

22nd December, 1938.

Grape Vine Diseases in Queensland.

R. B. MORWOOD, M.Sc., Research Officer.

THE grape vine is subject to the attacks of a large number of plant diseases of which the three most important in this State are downy mildew, powdery mildew, and anthracnose. These are the principal diseases in most grape-growing countries, except that in America black rot, which, fortunately, is not present in Queensland is even more serious than any of them. In addition, the vine is subject to a number of other maladies which, while not comparing with those mentioned in importance, may become quite serious under some circumstances. These include fruit rot, berry shrivel, dead-arm, autumn leaf spot, coulure, red leaf, and court noué. In this article brief descriptions are given of the three principal diseases to enable vignerons to recognise them and understand their methods of spread. This is followed by a combined account of their distribution and control, after which the other diseases are discussed.

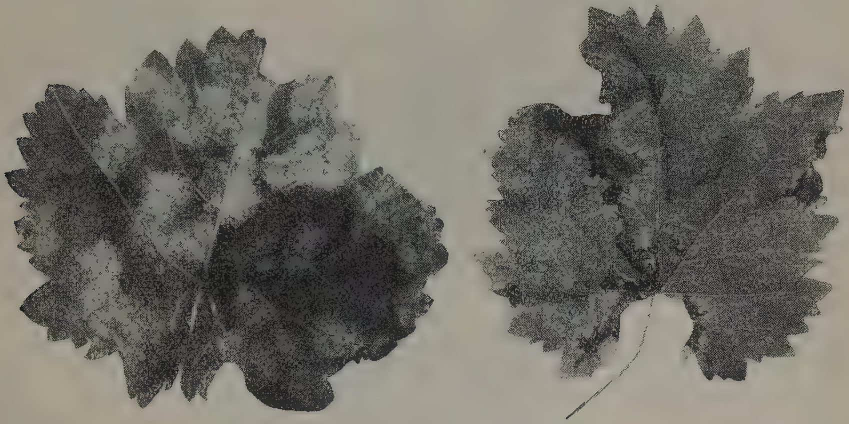

Plate 1.

Downy Mildew of the Grape.—*Left.*—The fruitifications of the fungus on the lower surface of the leaf. *Right.*—A later stage, as seen from the upper surface after the spots have dried out.

DESCRIPTION OF THE THREE PRINCIPAL DISEASES.

Downy Mildew.

The first sign of this disease is a light spotting on the leaves which may spread to occupy the greater part of the leaf area. In dry weather the spots turn brown, and heavily affected leaves shrivel. Under moist conditions a white mildew develops on them, particularly on the under surface of the leaves. (Plate 1.) When shoots are attacked before the leaves have fully developed, they become stunted and contorted. Affected fruit develop large blotches of a somewhat oily appearance with a dark margin and fall readily.

Downy mildew is caused by the fungus *Plasmopara viticola*, which grows inside the affected plant parts, only appearing on the surface to produce spores. The spores and their supporting threads constitute the white mildew which can be seen on diseased leaves in damp weather. The disease is spread during the growing season by the blowing of the spores to fresh leaves, where, in the presence of moisture, they

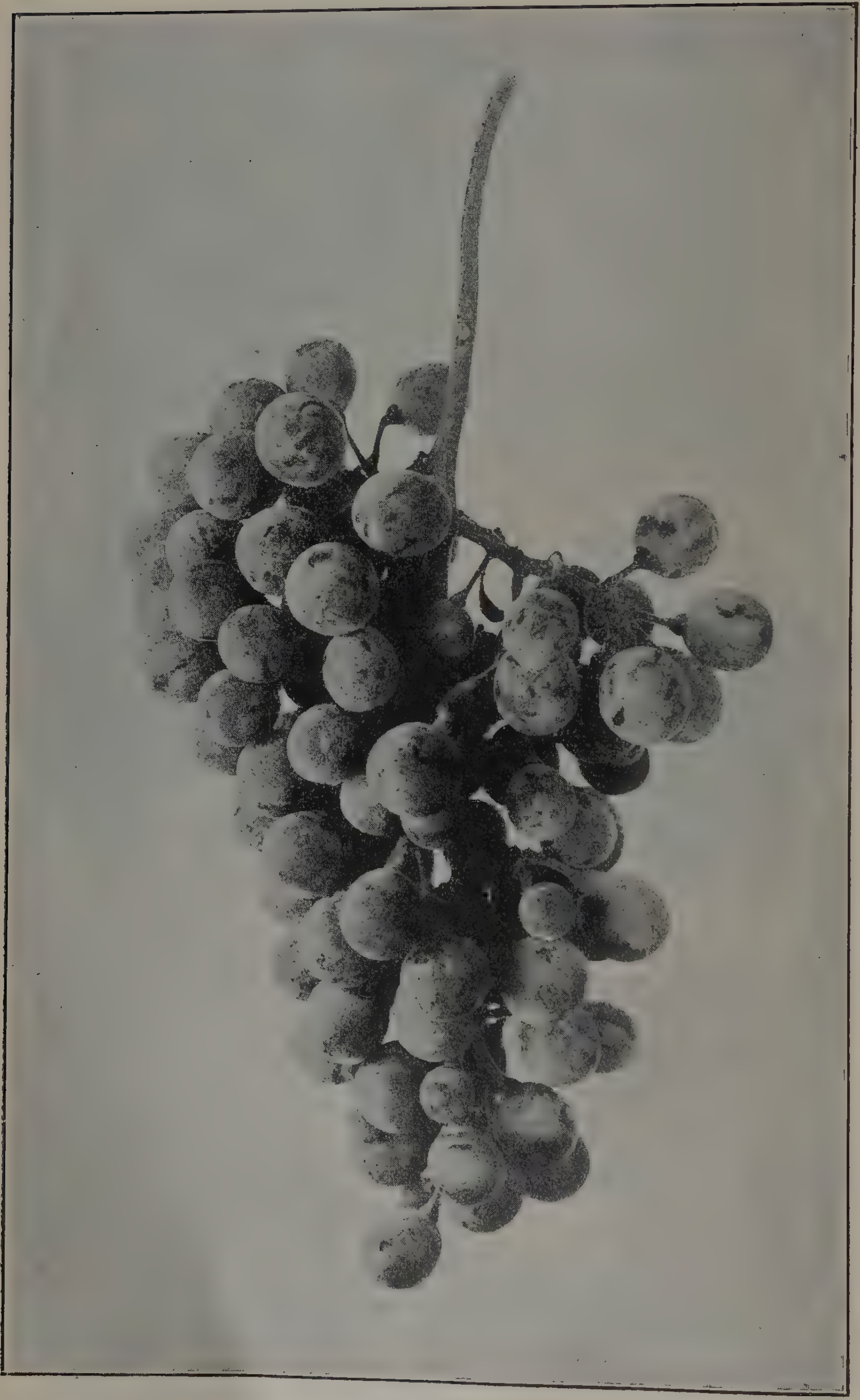

Plate 2.
Powdery mildew.

germinate and grow down into the underlying tissues. In the autumn another type of spore is formed internally, and this has a thick wall which survives the winter and initiates infection in the following spring.

All varieties of grape are susceptible to downy mildew, but the vinifera group, which is almost exclusively used in Queensland for commercial purposes, is more subject to attack than are American varieties. Stock effects on susceptibility have been recorded, but this is probably due to an alteration of vigour—the parasite finding more congenial conditions on a vigorously growing vine.

Powdery Mildew.

The principal symptom of powdery mildew is the presence of the actual parasitic fungus as a mildew on the surface of foliage or bunches. (Plate 2.) The mildew is distinguished from that due to downy mildew by its grey colour and by the difference indicated by their respective names, that is, the downy nature of the one and the powdery appearance of the other. Contortion of the foliage, stunting, hardening and skin cracking of the berries can result from powdery mildew infection.

The disease is caused by the fungus *Uncinula necator*, which grows on the surface of the vine, sending in short projections to derive nourishment from the underlying tissues. Summer spores blown about by the wind serve for the rapid dissemination of the disease. As with downy mildew, a second spore stage occurs for the overwintering of the fungus. However, in many countries, including Queensland, this other spore stage is rare, and overwintering probably occurs by means of fungous threads or summer spores protected within the bud scales of the vine.

Anthracnose.

Anthracnose is readily distinguished by the presence of numerous black spots on leaves, stems, and fruit. (Plate 3.) Infection takes place on young tissues, and the spots enlarge as the leaves and other parts expand. On the stems they eventually become deep cankers. Anthracnose reduces crop yields indirectly due to curtailment of leaf area, and malformation of canes and directly due to spotting of berries and dropping of fruit. The fruit falls following infections on the fruit stalks which frequently become completely girdled.

The disease is due to the fungus *Elsinoe ampelina*, an internal parasite. Spores are borne on the surface of the lesions, but are less conspicuous than those of the last two diseases discussed. The fungus survives the winter in the cankers. Varieties of grapes vary greatly in their susceptibility to anthracnose. American varieties are resistant, as are also Gros Coleman and Royal Ascot of the vinifera grapes. The majority of other varieties in common cultivation in Queensland are liable to the disease to a greater or lesser extent.

DISTRIBUTION OF THE PRINCIPAL DISEASES.

Of the three main grape-growing districts, the East Moreton, Stanthorpe, and Maranoa, the coastal areas of the East Moreton are most severely affected by disease. In these regions downy mildew finds the damp conditions so favourable to its development that it would frequently defoliate commercial varieties of grape if unchecked. Even in spite of the energetic adoption of control measures, in particularly wet seasons it causes considerable losses. Anthracnose and powdery mildew are of lesser importance on the coast, but further inland they occur more frequently than downy mildew. Powdery mildew thrives in comparatively dry conditions unless the vines are adequately sprayed or dusted.

Anthracnose is, of course, only serious on susceptible varieties, and fails to develop even on these in a dry spring. In the Stanthorpe district, with its elevated situation and medium though variable rainfall, conditions are frequently suitable for the development of all three diseases, but as a rule they are readily kept under control by adequate attention to spraying and dusting.

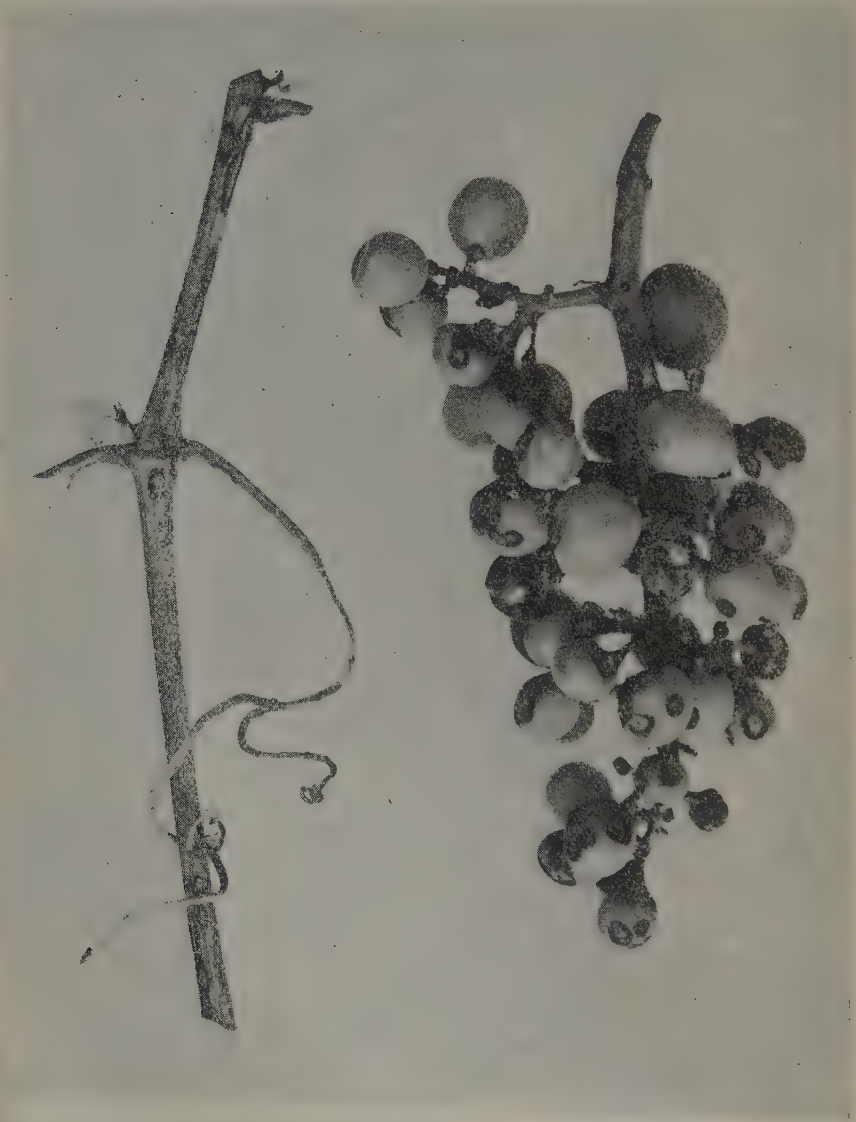

Plate 3.
Grape anthracnose.

CONTROL OF THE PRINCIPAL DISEASES.

An important factor in disease control on deciduous plants, including vines, is the thorough cleaning up during the off season.

Prior to budburst all prunings, fallen leaves, and mummied fruit should be burnt or well buried in order to minimise sources of infection for the following season.

This should be supplemented by a spray programme. For varieties which are subject to anthracnose this should commence with an application of 6-4-40 Bordeaux at budburst. With other varieties it will not be necessary to spray till the new shoots are 6 to 8 inches long, when an application will be necessary for the prevention of downy mildew. The Bordeaux mixture forms a coating on the plant which prevents the germination and entry of the fungus spores, and the first application should be repeated to cover new growth as it appears and to renew the coating on the older portions as it weathers off. The interval between sprays and the number required vary with the district and the season, the more frequent applications being needed when conditions are moist. Three to five applications at intervals of two to three weeks are usually required at Stanthorpe to control downy mildew, whereas in the wetter districts it is frequently necessary to spray every ten to twelve days. In the Maranoa, spraying is generally unnecessary during the growing season. Bordeaux mixture at a 4-4-40 strength is recommended for all sprays later than budburst.

Spraying while the grapes are in flower should be avoided, but, where spraying is required, an application should be made as soon as the berries have set. This is particularly important for the prevention of anthracnose on the bunch in varieties subject to this disease. Spraying should cease in good time before the berries ripen, in order to avoid undesirable residues at the time of marketing.

Notes on the preparation of Bordeaux mixture and of Burgundy mixture, which may be substituted if desired, are given later. If a ready mixed Bordeaux powder is used in the preparation of the spray, then it should be made up to a strength equivalent to that of the Bordeaux mixture recommended. For example, 8 lb. of a prepared powder containing 12·5 per cent. copper should be used in 40 gallons of water to be equivalent to a 4-4-40 mixture. The percentage of active constituent will be found on the label of containers of prepared powders.

The copper sprays will not control powdery mildew, and for this disease sulphur has to be used. The sulphur may be applied as a dust, or colloidal sulphur may be added to Bordeaux mixture at the rate of 1¼ lb. or ¾ pint to 40 gallons. Colloidal sulphur should be thoroughly stirred before being weighed or measured out. Sulphuring should commence with the warmer weather when the vines have made considerable growth. Three to five applications may be needed, according to the severity of the diseases in the district. Contrary to spraying, sulphur dusting of the vine while in bloom is harmless; in fact, it may assist in the setting of some varieties. Sulphur is most effective when applied on a warm day, but if used during a heat wave some burning of the vine may result.

A little spray burn may be apparent on the leaves after the use of Bordeaux mixture. While this is to be regretted, as any reduction of leaf area will ultimately react to the detriment of the crop, no immediate loss is evident. Spray burn can best be avoided by correct mixing of the spray and adequate attention to the efficiency of spray outfit. Large or jagged apertures in the spray nozzle, or low pressures at the pump, result in spray injury. Spray forced through a small, round

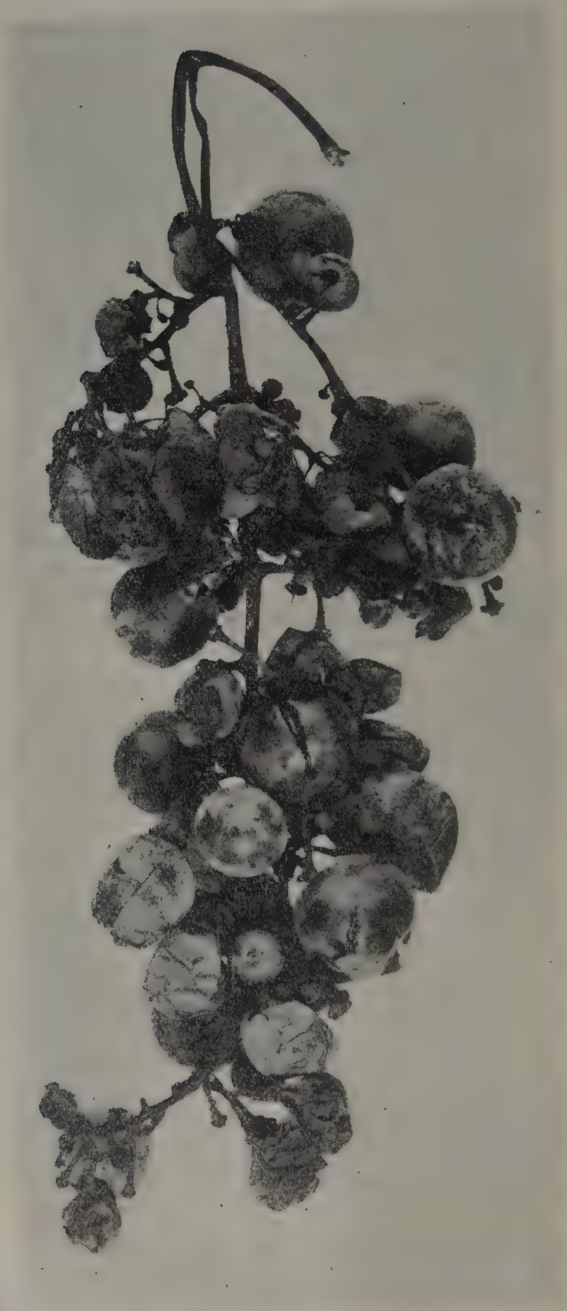

Plate 4.
Bitter rot following downy mildew.

aperture at high pressure breaks up into minute droplets. Enlargement of the aperture or lowering of the pressure results in larger drops, which are more likely to injure tender foliage. The spray nozzle should not be held too close to the vine.

DISEASES OF MINOR IMPORTANCE.

Fruit Rot.

Grape berries, particularly those on vines on which spraying has been neglected, are liable to the development of rot when ripening. The rots may be caused by one or more of a number of different fungi, of which *Botrytis cinerea* and *Melanconium fuligineum* appear to be the most common. They are, however, largely influenced by predisposing factors, such as the presence of other diseases, wet weather during the ripening period, or injuries, either mechanical or due to insects.

Grey mould rot is the name given to the rot caused by *B. cinerea,* which is recognised by the conspicuous mould which often involves whole bunches. It develops only when prolonged wet periods are experienced while the berries are ripening. This disease has also been termed ''noble rot,'' as the inclusion of a percentage of affected berries in a vintage is considered to improve the flavour of the resultant wine.

Berries affected with bitter rot (Plate 4) caused by the fungus *M. fuligineum* are darker than normal and covered with minute black specks. This rot commonly follows an attack of downy mildew and completes the damage done by that disease.

The control of fruit rots is rendered difficult by the necessity for avoiding any adverse effect on the appearance of the ripening berries or undesirable residues on them. A non-staining spray is desirable and ammoniacal copper carbonate has been recommended for this purpose. This spray leaves no appreciable residue, but the ammonia is liable to cause a certain amount of injury, and a weak Burgundy mixture (1-1½-40) is considered to be the best spray to use when fruit rots are feared. Frequently an attack comes on during a period of wet weather when it is not possible to spray and losses are unavoidable. Arranging the planting of vineyards so that varieties ripening at different periods are included not only spreads the work of marketing over a longer period, but also lessens the risk of heavy loss from ripe rot. The loss due to a spell of bad weather during the ripening period of only one variety will not be felt so severely as if the whole vineyard were affected.

Berry Shrivel.

Grapes, like many other fruits, suffer during a spell of hot weather or drying winds. The leaves withdraw water from the fruit when the roots fail to keep up with the heavy demand. Shortage of moisture in the soil hastens this effect. If more than a little moisture is so withdrawn, permanent injury is done to the fruit. In the grape this takes the form of a berry shrivel. Berry shrivel is often noticed after a return to normal conditions when the vines have otherwise completely recovered from the moisture deficiency and the cause of the trouble is not obvious. Nevertheless, the temporary heavy demand for moisture made by the leaves has been the cause of the trouble. When irrigation is available the water supply should be maintained at a high level during hot, dry weather, and where irrigation is absent cultural practices should be such that all possible moisture is conserved. In the drier districts vines should be widely spaced so that the roots have a greater area of soil to call upon for moisture supplies. Topping, or the removal of portions of the foliage, may lower the demand of the vine for water, but care must be exercised to avoid exposing the fruit with the risk of sunburn. Topping should not be carried out excessively or without good reason, as any reduction of leaf area of the vine tends to lower the provision of food reserves for future crops and an adverse effect on yield will eventually occur.

Dead Arm.

This disease has occasionally occurred on a few vines in Queensland. It is caused by the fungus *Cryptosporella viticola*—a wound parasite which enters injuries or large pruning cuts and develops in the vine. Portions of the vine beyond the point of injury become unthrifty and finally die. Affected portions should be cut away well below visible infection and the cut treated with tar.

Autumn Leaf Spot.

Spots differing from those caused by downy mildew in their more regular shape and smaller size are liable to develop in vine leaves late in the season. They are due to the fungus *Cercospora viticola*. Although the reduction of effective leaf area and the possibility of premature defoliation must have some adverse effect on the yield of the following season's crop, it is usually not sufficiently serious to warrant the adoption of expensive control measures. If desired, Bordeaux mixture may be used after the fruit is picked.

Coulure.

''Coulure'' is the name given to the non-setting of fruit which is prevalent in a number of varieties. Affected bunches may produce no fruit or may be represented by a stage intermediate between this condition and the normal. Individual berries may be shed or may be represented by small seedless fruit. Bunches carrying a number of fully developed berries together with numerous undersized ones are commonly referred to as ''hens and chickens.'' Such bunches even when not a total loss are difficult to pack and market attractively. (Plate 5.)

Coulure is generally attributed to failure of effective pollination and a number of physiological factors may be involved. Extremes of weather conditions, either cold and damp or very hot and dry, are favourable to the development of the trouble in some varieties. In other instances it may result from the failure of pollen to reach the stigma when artificial pollination should assist fruit-setting. Some success may attend lightly drawing the hand over bunches when in flower. It is claimed that sulphuring the vines when in flower has a beneficial effect, and this may be due to the disturbance and distribution of the pollen.

Red Leaf.

The vine is subject to physiological disorders which result in the production of red, brown, and autumn tints in the leaf, frequently in a definite pattern. A number of names have been applied to this disease or group of diseases, including Californian vine disease and brunnisure, as well as red leaf. Physiological diseases are due to unfavourable environmental factors, but the nature of the particular factor or factors

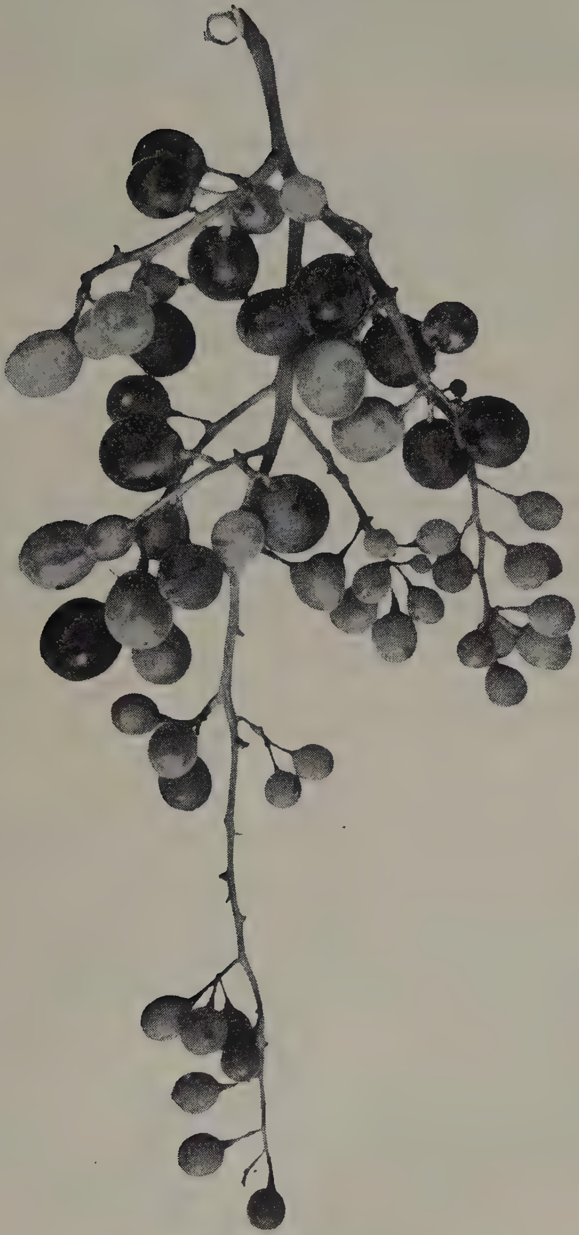

Plate 5.
Coulure of the grape.

concerned is frequently rather obscure. In the case of red leaf of the vine they are not well understood, but one factor which appears to be frequently associated is overbearing in the previous season.

Recommendations for control include adequate attention to cultivation and fertilizing—farmyard manure being preferred for general soil improvement—and the limitation of cropping by appropriate pruning.

Court-noué.

"Court-noué" is the name given to a condition of the vine in which excessive branching, together with shortening of the internodes and production of deeply-notched leaves, gives the appearance often referred to as "parsley-leaved." Affected vines set few berries. The cause of the malady is not understood but, fortunately, it is of rare occurrence.

THE FUNGICIDES.

Bordeaux Mixture.

Bordeaux mixture is the most valuable and widely used spray for the vine. It depends for its action on the formation of a thin film of a copper compound on the leaf. The copper is toxic to germinating fungus spores, but must be insoluble in order to prevent injury to the plant, and in order that it will not be readily washed off. The ideal in the preparation of Bordeaux mixture is the production of a fine gelatinous precipitate which will stay in suspension, will spread well, and will adhere to the foliage.

Formulæ—

	6-4-40.	4-4-40.
Bluestone (copper sulphate)	6 lb.	4 lb.
Burnt (quick) lime	4 lb.	4 lb.
Water	40 gallons	40 gallons

The stronger (6-4-40) mixture is used at budburst or when disease is likely to be severe; otherwise the 4-4-40 mixture is effective.

Preparation.—Dissolve the bluestone in half the required amount of water in a wooden or copper vessel. If crystals are used, this is best done by tying them in a piece of sacking, which is left suspended in the top of the water overnight. Bluestone fines can be obtained, which dissolve readily in hot water. Tinned or galvanised iron is not suitable for holding bluestone solution, as the chemical rapidly eats through the metal. Tins may be used if they are coated inside with melted pitch.

A good-quality hydrated lime may be substituted for the burnt lime, using one-third as much again in the case of the 6-4-40 formula. Agricultural lime or air-slaked lime is useless for making Bordeaux mixture. The lime should be dissolved in the remainder of the water. If quicklime is used, it should first be slaked with a small quantity of water.

The two solutions, bluestone and lime, are poured simultaneously through a strainer into a third container or the spraying vessel and the mixture stirred well for a few minutes. This method gives a fine gelatinous precipitate which does not readily settle out. If necessary, one solution can be poured directly into the other, provided the latter is kept well stirred during the process. Concentrated solutions should not be mixed before dilution, as the resultant precipitate tends to be of a granular formation and its spreading and adhesive properties are poor. For the same reason, the two solutions should be quite cold before mixing. Bordeaux mixture should be used as soon as possible after preparation, as it loses its gelatinous nature after several hours' standing and settles out in granular form.

Testing.—It sometimes happens that the lime used is of poor quality, and the resultant mixture may then contain an excess of bluestone. This must be avoided, as the soluble copper salt is able to cause injury to the plant sprayed. An excess may be tested for by applying litmus paper or phenolphthalein paper (obtainable from a chemist) to the layer of clear liquid on the top of the spray. With a correctly prepared mixture, the litmus paper is then coloured blue or the phenolphthalein paper red; otherwise more lime must be added. A rough test is given by allowing a clean knife-blade or bright iron nail to remain in the mixture for a few minutes. If on removal this shows a brown coating of copper, more lime is required.

Stock Solutions.—It is sometimes found convenient to make up a stock solution of bluestone and lime. Fifty lb. of bluestone is dissolved in 50 gallons of water in a wooden vessel. In another vessel 50 lb. of quicklime is slaked and water added to make up to 50 gallons. The solutions will keep well if protected from evaporation. One gallon of each will contain 1 lb. of bluestone or lime respectively, on which basis the necessary dilution before mixing for the preparation of any quantity of spray can be readily calculated.

Burgundy Mixture.

This spray has the same active constituent as Bordeaux, but differs in the replacement of lime by soda.

Formulæ—

	6-8-40.	4-5½-40.	1-1½-40.
Bluestone ..	6 lb. ..	4 lb. ..	1 lb.
Washing soda ..	8 lb. ..	5½ lb. ..	1½ lb.
Water	40 gall. ..	40 gall. ..	40 gall.

The 6-8-40 and the 4-5½-40 strengths are used in place of Bordeaux mixtures containing the same amounts of bluestone. The 1-1½-40 is a weak mixture for late application, when it is used on account of the small amount of residue it leaves on the fruit.

Preparation.—The preparation is essentially the same as in the case of Bordeaux, except for the substitution of washing soda for lime. Fresh crystals of washing soda should be used. If the crystals are left for some time exposed to the air, they give off water of crystallisation and crumble to a powder. The powdered material should not be used, as it contains more actual soda to the pound, and the quantity required cannot be accurately gauged.

Concluding Remarks.

The number and severity of the diseases discussed in these notes will doubtless leave the impression that grape-growing is a hazardous occupation. When grapes are grown in a haphazard manner this is so, but the careful grower maintains his vineyard in a practically disease-free condition, except in very adverse weather conditions. This is attained by careful planning of the vineyard, followed by due attention to all details of culture, pruning, and fertilizing, supplemented by orchard sanitation and an adequate spray programme. In the section on control measures is given general information on spray programmes, but for the exact requirements of any particular location local experience is of great importance. The grower would be well advised to err on the side of a little excess spraying rather than too little, the additional expenditure being regarded as an insurance against conditions favourable to disease.

[Photo. J. A. Lunn, Lands Department.

Plate 6.

IN THE BEAUTIFUL WEST PALMERSTON JUNGLE LANDS, NORTH QUEENSLAND.—The view down the gorge from Crawford's Lookout.

Hoya australis (Wax flower)—a Native Plant Poisonous to Stock.

By JOHN LEGG, D.V.Sc., Senior Veterinary Officer, Animal Health Station, Yeerongpilly, and C. T. WHITE, Government Botanist.

Contribution No. 4 from the Poison Plants Committee, Department of Agriculture and Stock, Brisbane, established as a result of a grant from the Australian Wool Board for the purpose of conducting investigations with plants suspected of being poisonous to stock.

HOYA *australis* is a fleshy climber; a milk-like sap runs freely when the plant is cut. The leaves are opposite, usually shiny above and pale beneath. When growing in exposed places where soil is scarce, as on rock faces, it may be dwarfed and bush-like with thicker leaves.

The leaves are blunt at the top and oblong in outline, 3 or 4 inches long and up to 2 inches wide, and borne on a short stalk up to ¾ of an inch in length. Flowers are in "umbels" in the axils of the leaves and radiate out from the top in a fleshy peduncle. They are sweetly scented and on a short stalk about ½-1 inch long. Seedpods are generally in pans mostly and 4-5 inches long. When ripe they burst down one side and free the seeds. Each seed has a tuft of fine silky hairs.

The plant is widely spread in Queensland and Northern New South Wales, and is also found in the islands of the South Pacific. It grows mainly in the drier rain forests, and extends some distance inland from the coast. A common situation is on the side and tops of hills among the rocks, in such places as the Glass House Mountains.

It is generally known as "Hoya" or "Wax Flower," the latter, however, is a common name for many native plants.

Poisonous Properties.

The plant has been accused of poisoning stock, mainly cattle, though poisoning of sheep has also been suspected on more than one occasion. Bailey (this Journal, 1915, p. 345) states that some specimens from Nanango were tested at Yeerongpilly on four guinea pigs, two of which developed symptoms of paralysis, one dying on the third, the other on the four day.

Experiments on Sheep.*

Minced fresh leaves were force fed to two sheep in varying amounts of approximately 2-3 lb. over a period of two days. Both sheep died. Another sheep was drenched with the watery extract obtained by washing minced leaves in water overnight and then pressing out the residue. This sheep also died.

The main symptoms noticed were at first a listless appearance and a staggering gait. One animal was noticed to be kneeling frequently, a symptom said to be common in cattle when poisoned naturally. Once the animal assumed the recumbent position, it soon stretched out on its

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* A full report of the tests on sheep will appear in the Australian Veterinary Journal.

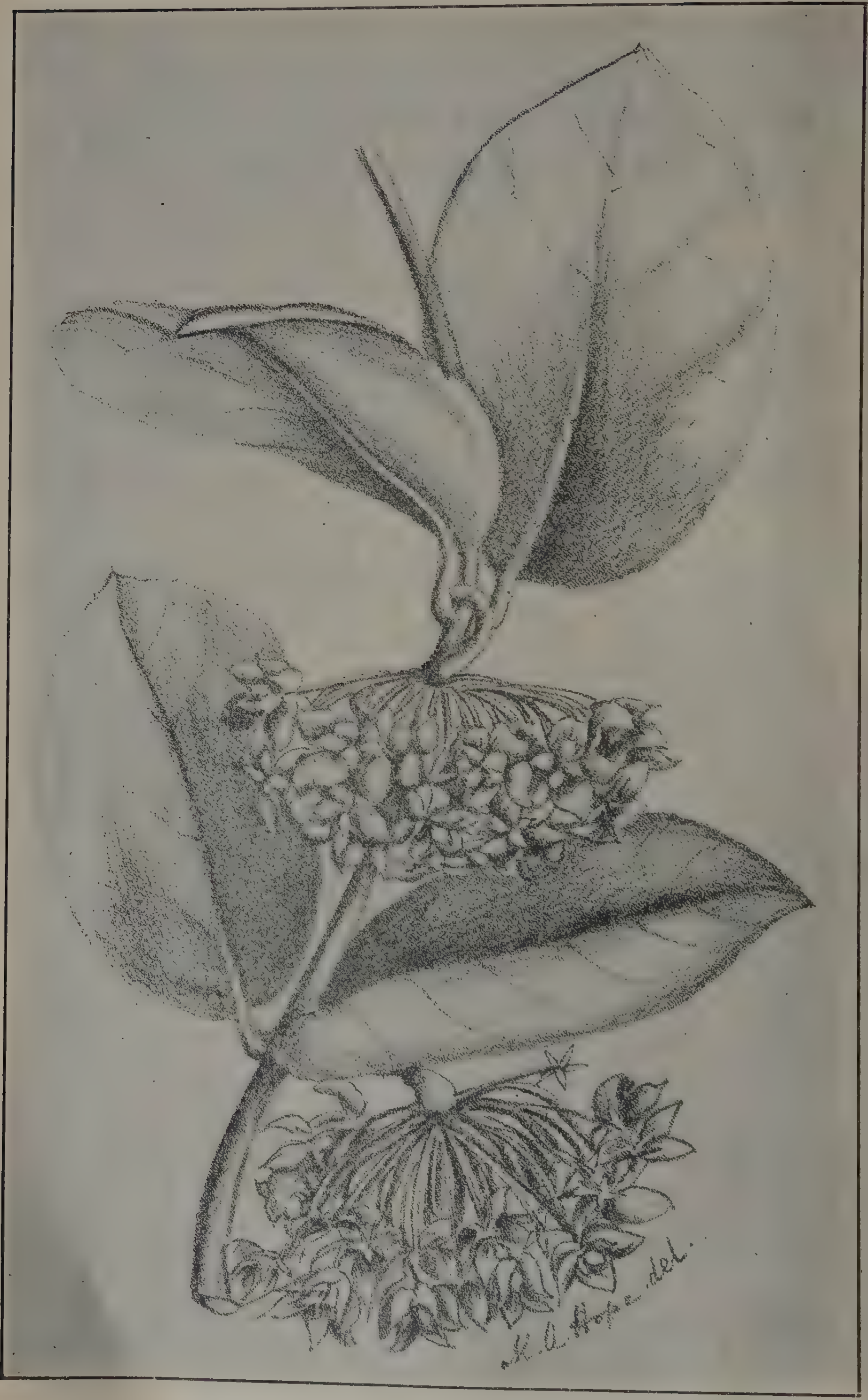

Plate 7.

HOYA AUSTRALIS.—A plant generally known as "Hoya" or "Wax Flower." The latter, however, is a common name for many native plants.

side with limbs extended. "Pirouetting" of the eyes was also noticed. The position became aggravated after a few hours and the animal was destroyed.

Post-mortem showed nothing beyond a slight congestion of the alimentary tract.

Conclusions.

1. *Hoya australis* is a poisonous plant for sheep.

2. Small amounts, as low as a lb., will cause death in a little over twenty-four hours.

3. A peculiar kneeling position was noticed in one animal. Extension of the limbs and "pirouetting" of the eyes were also noticed.

Plate 8.

A FARM IN THE MAKING.—A well-grassed clearing in the rain forest country, near Granadilla, North Queensland. This land is typical of the newly-settled areas on the northern tropical coast.

The Determination of Salt in Butter.

L. A. BURGESS, A.A.C.I., Dairy Technologist.

IN a previous article[1] the importance of maintaining an even percentage of salt in butter was emphasized. It was also pointed out that partial standardization of composition was attainable by the intelligent use of accurate moisture and salt tests. The performance of both tests is considered very important, particularly in those factories which, for various reasons, do not employ a technical officer or participate in a technical service. It is only by such means that satisfactory methods are evolved.

The conditions necessary for accurate moisture tests with various types of balances have already been discussed,[2] and a plan of a small laboratory suitable for a large number of chemical and bacterial tests was included. A modern butter factory without such facilities may be likened to a police force without detectives. It remains to describe a suitable method for the determination of the percentage of salt, and the manner in which the tests can be utilized.

One method only, of the many available, has been selected for description. It has been chosen because of the similarity in calculation to the acidity tests, its simplicity, cheapness, and rapidity, ten minutes being ample time for its performance. It is really an extension of the moisture test, the residue of the 10 grams of butter being used for the determination of salt.

Material Required.

A balance on which exactly 10 grams of butter are weighed for the moisture test is essential. The additional materials required are:—

(1) *Glass Stirring Rods.*—These should be 4 to 5 inches long and three-sixteenths of an inch in diameter. The ends should be smoothed and rounded in a flame.

(2) *Measuring Cylinder.*—100 ml. graduated in 1 ml. divisions.

(3) *Pipette.*—Either a 25 ml., 20 ml., or 17·6 ml. pipette may be uesd.

(4) *Burette.*—This may be either of 25 ml. or 50 ml. capacity graduated in 0·1 ml. divisions. It must have a glass stopcock.

(5) *White Titration Vessel.*—A shallow porcelain dish holding about 100 ml., or a shallow white china cup may be used.

(6) *Mixing Vessel.*—This is used to mix the residue from the moisture test with a measured volume of distilled or rain water. A malted milk mixer or shaker is quite suitable, but a wide-mouthed bottle with a cork, rubber or glass stopper will also serve. A clever mechanic should be able to construct a suitable lid for the moisture test cup, in which case the mixing may be performed therein.

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[1] Q.A.J., July, 1938, Vol. L., Part 1, page 10.

[2] Q.A.J., July, 1938, Vol. L., Part 1, page 13.

(7) $\frac{N}{23{\cdot}4}$ *Silver Nitrate Solution.*—1 ml. of this solution is equivalent to 0·0025 gram of sodium chloride (salt) and it should therefore be obtained from a reliable chemical supply house or prepared by an experienced analyst. It should be supplied in a brown glass-stoppered bottle and should be kept away from light. The solution should not be allowed to remain in the burette after use, as light causes silver to be precipitated and weakens the solution.

(8) *Potassium Chromate—Solution* (10 per cent.).—This is the indicator solution. Its strength is not very important but it must be prepared with distilled or rain water.

(9) *Distilled* (*or Rain*) *Water.*—Natural waters contain salt in varying amounts and should not be used.

Procedure.

Weigh out 10 grams of butter and perform the moisture test. Warm a quantity of the distilled or rain water to a temperature of about 120 deg. Fahr.

In the measuring cylinder, measure out the quantity of warm water shown below.

If a 17·6 ml. pipette is to be used— 70 ml. of water.
If a 20 ml. pipette is to be used— 80 ml. of water.
If a 25 ml. pipette is to be used—100 ml. of water.

(It should be noted that the volume of water required is four times the capacity of the pipette.)

Add about a quarter of the measured volume of water to the residue of the 10 grams of butter in the moisture test cup and stir thoroughly with a glass rod.

Pour the liquid into the mixing vessel.

Add a further 20 to 25 ml. of the water to the cup and stir again.

Pour this liquid also into the mixing vessel.

Repeat the addition of water to the moisture test cup, stirring and pouring into the mixing vessel until all the water has been used and all the remains of the butter have been transferred, but in no case use more than the quantity of water originally measured out. The water must be warm enough to keep the fat in a melted condition. If a close-fitting lid for the moisture test cup is available, the whole of the water may be added direct to the butter residue and the mixing performed at once in the cup.

Mix the liquid in the mixing vessel by vigorous shaking or stirring with a plunger. It is essential that the mixing be vigorous as the fatty coating on the solid material must be destroyed in order that the water may dissolve the salt.

Allow to stand undisturbed for 2 to 5 minutes so that the fat may rise to the surface.

Insert the tip of the pipette below the fat layer and fill from the lower water layer by suction. Adjust the bottom of the meniscus to the graduation mark on the pipette and allow the contents of the pipette to run into the titration vessel.

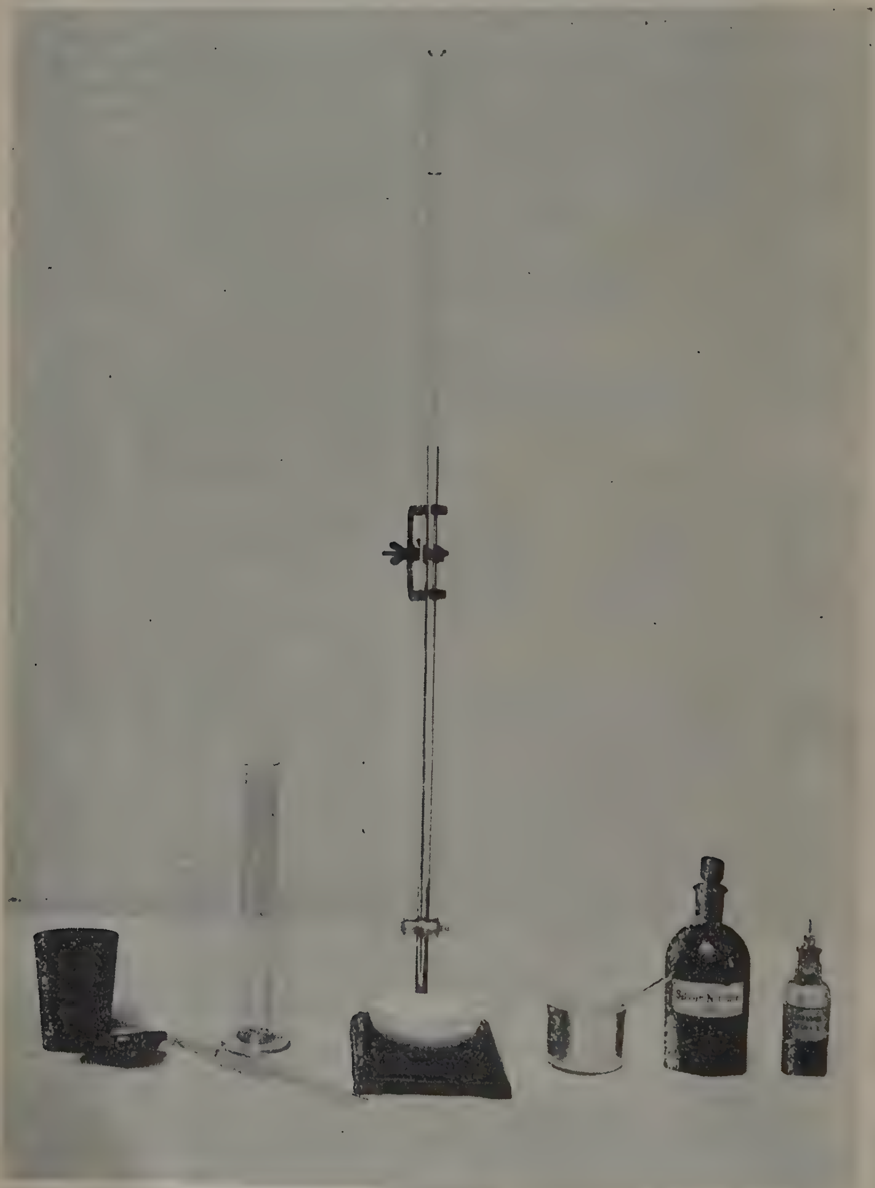


Plate 9.
Apparatus for salt test.

Add four to six drops of potassium chromate solution to the liquid in the titration vessel.

From the burette allow the silver nitrate solution to run into the titration vessel and stir with a glass rod. The formation of a red colour marks the end of the titration.

To obtain the percentage, read off the number of millilitres of the silver nitrate solution used and divide by ten.

Example.—A titration of 14·2 ml. shows the salt to be 1·42 per cent.

Theory of the Test.

During the titration a white precipitate of silver chloride is first formed by interaction of the salt and silver nitrate.

$$\mathrm{NaCl} + \mathrm{AgNO_3} \longrightarrow \mathrm{AgCl} + \mathrm{NaNO_3}$$

$$\begin{array}{ccccccc} \text{Sodium} & & \text{Silver} & & \text{Silver} & & \text{Sodium} \\ \text{Chloride} & + & \text{Nitrate} & \text{forms} & \text{Chloride} & + & \text{Nitrate} \end{array}$$

As soon as all the sodium chloride has reacted in this way, the excess silver nitrate reacts with the potassium chromate forming silver chromate (which is an intense red colour), and potassium nitrate. The formation of red silver chromate thus serves to mark the end of the titration.

Applications.

(1) *Butter Standardization.*—The four constituents of butter which are determined in routine analyses are water, salt, curd, and fat. The water and salt having been determined, and an assumption made for the curd, the fat may be determined by difference. The curd percentage of butter differs from factory to factory, but is reasonably constant for each factory as neutralizing, pasteurising, churning, &c., are usually carried out in the same manner each day. The average percentages range from 0·5 to 1·0 per cent., the average being about 0·8 per cent. A factory knowing its average to be 0·6 per cent. can safely make that assumption, but if the factory average is unknown, the State average of 0·8 per cent. may be assumed. By subtracting the sum of the percentages of water, salt, and curd from 100, a reasonably accurate figure for the fat percentage is obtained. It should be especially noted that inaccurate moisture and salt tests will lead to inaccurate figures for the fat percentage.

Examples:—

Average for 1 week.

Water .. .. = 15·3 per cent.
Salt .. .. = 1·1 per cent.
Curd (assumed) .. = 0·8 per cent.

17·2 per cent.

Fat .. .. .. = 100—17·2 = 82·8 per cent.

This shows that 82·8 lb. of fat are being used to manufacture 100 lb. of butter. By modifying the factory methods, it may be found that the average composition at a later date is—

Water	=	15·6 per cent.
Salt	=	1·4 per cent.
Curd (assumed) ..	=	0·8 per cent.
		17·8 per cent.
Fat	=	100 — 17·8 = 82·2 per cent.

In this case only 82·2 lb. of fat are being used to make 100 lb. of butter. The percentage increase in manufacture is determined by simple proportion as follows:—

82·8 lb. of fat used to make 100 lb. of butter.

$$82{\cdot}8 \text{ lb. of fat now makes } \frac{100 \times 82{\cdot}8}{82{\cdot}2} = 100{\cdot}73 \text{ lb. butter.}$$

Increase in manufacture = 0·73 per cent.

On a production of 1,000 tons of butter per year, the increased production of 0·73 per cent. means that an extra 7·3 tons of butter would be made, the value of which would be £876 at 120s. cwt.

(2) *Estimating Salt Losses.*—The value of the salt lost during the working of butter receives little consideration in a large number of factories because they are ignorant of how much of the salt is actually incorporated in the butter. This can be determined as shown in the following example:—

23 boxes (1,288 lb.) of butter were obtained from a churn.
22 lb. of salt were added.

The butter contained 0·31 per cent. of salt.

100 lb. of butter contain 0.31 lb. of salt.

$$1{,}288 \text{ lb. of butter contain } \frac{0{\cdot}3 \times 1{,}288}{100} = 4{\cdot}0 \text{ lb. of salt.}$$

Salt lost = 22—4 = 18 lb.

The following are actual figures obtained at a Queensland factory, and the complete figures for the day (six churns) were:—

Churn No.	1.	2.	3.	4.	5.	6.	All.
Butter obtained .. boxes	23	24	20	20	21	19	127 boxes
Salt added .. pounds	22	22	22	20	20	20	126 lb.
Salt .. .. percentage	0·3	0·5	0·7	0·8	0·7	0·7	0·62%
							Average
Salt incorporated pounds	4	6¾	8	9	8¼	7½	43½ lb.
Salt lost	18	15¼	14	11	11¾	12½	82½ lb.

The figures show that nearly two-thirds of the salt was being lost. Salting was being carried out at the rate of 40 lb. per ton, but only 13¾ lb. was being incorporated. The annual production was about 1,200 tons of butter and the annual loss of salt amounted to 31,500 lb. or over 14 tons, the value of which is by no means small.

For comparison the figures from a factory participating in the Butter Standardization Service are given. Regular salt tests are being performed at this factory and intelligent use has been made of them.

		Nov., 1937.	Nov., 1938.
Salt added per ton of butter	=	57 lb.	37 lb.
Salt incorporated per ton of butter ..	=	25 lb.	32 lb.
Salt lost per ton of butter	=	32 lb.	5 lb.
Salt lost per 1,000 tons .. .. .. (Annual production.)	=	14½ tons	2 tons
Percentage of salt in butter	=	1·12 per cent.	1·43 per cent.

Not only has this factory reduced the quantity of salt required per year from 58,000 lb. to 37,000 lb., but the quantity of salt incorporated has risen from 25,000 lb. to 32,000 lb. The monetary value of these altered conditions is—

	£
Value of 20,000 lb. of salt saved (approx.)	100
Value of 7,000 lb. extra salt incorporated and sold as butter at 120s. cwt.	750
Total	£850

These illustrations serve to show how accurate moisture and salt tests may be applied by intelligent factory officials, and also serve to show the important part which butter standardization plays in the dairy industry.

OVERSTOCKING GRAZING LANDS—SOME EVILS.

Stocking capacity is a point in the management of pastoral lands which is often neglected. It should be accepted as a truth that two well-fed sheep will give a greater monetary return than three half-fed animals and more than four half-starved sheep. The return from properly nourished sheep would be probably even higher were their greater resistance to internal parasites taken into consideration. Some of the evils of overstocking—altogether apart from total losses—are loss in wool per head, as the result of unthrifty growth; a possible break in the staple; poor lambings; a distinct loss on those animals which should be turned off as fats; and last, but not least, the erosion of country, of which overstocking is an important cause.

From the point of view of returns alone, it will be found that over a period of years a property stocked well within its carrying capacity will average far better returns than one where overstocking is the policy of the management.

Some graziers put forward the argument that, taking lean years into consideration, they have to stock to over-capacity to make ends meet. This policy is, however, considered to be wrong, especially when returns are averaged over a number of years.

Rejection of the First-Drawn Milk.

M. J. GRIFFITHS, B.Sc., Dairy Bacteriologist (Dairy Branch).

DAIRY farmers' troubles in regard to milk and cream quality usually begin in the cowbail at milking time. It is an unfortunate fact that bacteria of the types most harmful to keeping quality are always to be found in and around the milking shed. They may find their way into milk from many sources—the cow's coat and udder, dried dust and manure, the milker's hands if he neglects to wash them, or the milk utensils.

An additional source of contamination, which is often overlooked, is the small quantity of milk always present, even immediately after milking, within the narrow canal leading from the udder to the outlet of each teat. Here, bacteria entering from outside through the teat opening as soon as the cow lies down, and finding nourishment and a suitable medium and temperature for growth, may multiply and become established in enormous numbers in a few hours. Especially in the case of older cows, where the udder muscles have become slack, the bacteria can penetrate very easily into the teat canal through the enlarged opening.

The first operation, therefore, in clean milk production is the thorough washing of the outside of the cow's udder and teats, and the second is the removal of this first-drawn or "foremilk" so that it does not add large numbers of bacteria to the milk. Two or three streams of milk drawn off into a separate vessel before starting milking into the pail (or before affixing the machine) will be sufficient to wash the teat canal free, or almost free, of contaminating organisms.

The following figures, which are the results of experiments carried out to show the relative average numbers of bacteria found in the first, middle, and last-drawn portions of milk from a herd of twelve cows, show clearly the advantage of rejecting the first streams of milk, as well as of grooming the cows and keeping the surroundings clean:—

——	Foremilk.	Middle.	Last Drawn.
Cows not prepared and shed neglected	26,450 per c.c.	5,880 per c.c.	9,250 per c.c.
Cows groomed, shed neglected ..	13,720 per c.c.	2,430 per c.c.	3,130 per c.c.
Cows neglected, shed cleaned ..	13,360 per c.c.	2,200 per c.c.	1,550 per c.c.
Cows and shed cleaned	6,420 per c.c.	1,220 per c.c.	1,720 per c.c.

(Ref. Grant Lockhead, Dept. of Agric., Dominion of Canada.)

The work of many investigators shows that almost invariably the foremilk is the most heavily contaminated portion, though results and opinions vary as to the distribution of bacteria throughout the remainder.

It used to be thought that cleanly-produced milk must be almost sterile and that all bacteria found in it were from outside sources, but with the advance of dairy science it has been proved that the natural "count" of milk varies enormously according to the individual cow, and that milk as it comes from the udder is rarely, if ever, completely free from bacteria. Some representative results are given below:—

——	Foremilk.	Middle.	Strippings.
Harding and Wilson (average of 5 cows over 6 days)	458 per c.c.	187 per c.c.	274 per c.c.
Orla-Jensen (one cow)	16,000 per c.c.	480 per c.c.	360 per c.c.
Copeland and Olsen (8 cows) . .	5,989 per c.c.	557 per c.c.	415 per c.c.

One American worker (Stocking), quoted by Hammer, tested the different streams of milk to find out the extent of the heavy preliminary contamination, with the following results:—

Trial Number.	Streams 1 and 2.	5 and 6.	9 and 10.	13 and 14.	Strippings.
1	1,940 per c.c.	550 per c.c.	250 per c.c.	275 per c.c.	216 per c.c.
2	25,200 per c.c.	5,391 per c.c.	285 per c.c.	218 per c.c.	101 per c.c.
3	5,491 per c.c.	2,096 per c.c.	430 per c.c.	820 per c.c.	141 per c.c.
4	7,941 per c.c.	1,350 per c.c.	125 per c.c.	216 per c.c.	156 per c.c.

These figures show the substantial decrease, even in very clean milk, after four streams have been removed. The reduction in count obtained by discarding the first three streams of milk from each teat has been found to amount to about 4 per cent. of the whole milking. (Ref. Hammer, "Dairy Bacteriology.") This quantity does not at first appear to be very significant, but a consideration of the types of bacteria present will show its importance. In the foremilk are mainly soil and water organisms and coliform types which are injurious to milk, whilst the flora of the middle and last-drawn portions of milk consists of inert udder types which are natural inhabitants of the normal healthy udder and are not undesirable in milk or harmful to its quality. For the production of clean milk to be used for human consumption, rejection of the first-drawn milk is obviously of assistance in maintaining a high standard of purity and good keeping quality; but in the case of milk production for butter or cheese making also, the practice has more advantages than disadvantages.

The most important reason why *every* farmer should make a practice of removing the foremilk regularly morning and evening is that it enables him to notice anything abnormal in the appearance of the milk. Signs of mastitis usually show up in the form of tiny clots or strings in the first-drawn milk, which, if observed, may mean the early detection of the disease in animals having one or more affected quarters. Special care may then be taken to milk these infected cows last; their milk can be isolated from the rest, and the spread of the disease can be arrested. Neglect or ignorance of mastitis infection, however, in its early stages may have serious and far-reaching effects on the individual cow, on the bulk milk, and on other animals in the herd.

A word of caution is necessary as to the method of removing this first-drawn milk. Under no circumstances must it be withdrawn on to the floor of the milking shed, for this is one of the surest ways of spreading any infection that may be present. Apart from this, decomposition will take place, with accompanying bad smells and attraction of flies.

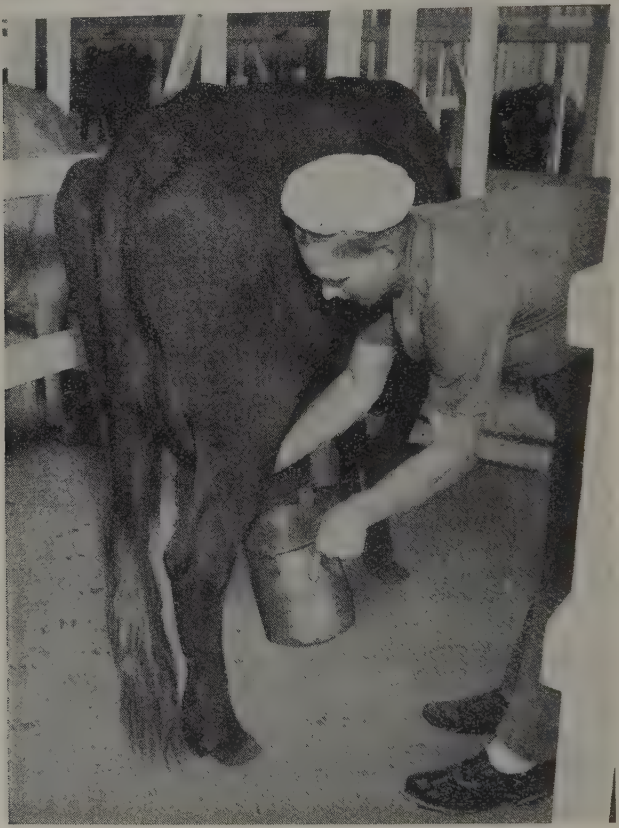


Plate 10.
Method of Removing the Foremilk.

On many modern milk-producing farms in England a ''strip-cup'' is used, consisting of a small vessel fitted with a black-enamelled lid, over which each stream of milk passes before flowing through a hole into the cup below. This makes it possible to see at a single glance if any quarter is yielding stringy or abnormal-looking foremilk, and with such a system in use at each milking a case of mastitis cannot become advanced without the knowledge of the milker. Any ordinary small pail or billycan will, of course, serve the purpose, but it should be kept for this only and washed and scalded daily.

The foremilk will not amount to a great quantity except in the case of a large herd, but if it is free from any signs of disease it can be used for calf or pig feeding. It is advisable to pasteurize or bring it up to boiling point and cool before using. If it contains milk from several diseased cows, it is advisable to dispose of it, after adding some disinfectant, by emptying *well* away from the cowbails and water supply. The pail should then be washed, scalded thoroughly, and rinsed with disinfectant.

It is well known that the highest percentage of butterfat in milk is found to be contained in the strippings, and that the first-drawn milk is the poorest portion, showing the lowest butterfat and the highest water percentage. Average analyses of the milk of seven cows, made by Eckles, showed only 10·67 per cent. of milk solids to be present in the foremilk, compared with 14·86 in the strippings, the difference consisting almost entirely of fat. Thus thorough stripping of every cow (done gently and not by downward jerking of the udder) will bring its own reward in the form of increased butterfat yield and stimulation of secretion by the milk glands; whilst the loss in butterfat occasioned by removing the first few streams of milk is negligible, and the slight reduction in the quantity is more than offset by the improvement in keeping quality of the bulk milk.

DAIRY CATTLE—PURE-BRED OR GRADES?

The question is often asked: Which is the more profitable—pure-bred or grade dairy cattle? The difference in value of pure-bred and high-grade dairy cattle lies in the higher selling price of the pure-bred. Dairy farms which are so equipped that they can handle the record work effectively will find more profit in pure-bred than in grade cattle. There is a steady market for high-quality pure-bred cattle at prices which net good returns to the breeder. Whether pure-bred stock will show the best results with any particular dairy farmer depends, however, on his keeping authentic records and also on his ability as a salesman. Pure-bred cattle which a breeder is unable to sell are no more valuable to him than an equal number of good grades.

A herd of carefully selected grade cows will produce as heavily as the average pure-bred herd, for the reason that they can be culled more closely, as their lower value does not encourage keeping an animal which is not a profitable producer. There is always a good demand for the female offspring at payable prices. Any person going in for dairying for the purpose of producing milk or cream, and not with the idea of gaining a large part of his income from the sale of stock, may do quite as well with grades as with pure-breds.

As in most things, success with dairy cattle depends on the individual farmer himself, and whether grade or pure-bred cattle are more desirable can be settled only when the particular conditions surrounding the individual case are considered.

It is sometimes stated that grade cows are better than pure-bred animals. This is not so, but it is true that some grades are better than some pure-bred stock.

One very important fact to remember, however, is that the herd sire should always be a pure-bred. Unfortunately, this is not sufficiently understood by some Queensland dairy farmers, and this accounts to a very large extent for the poor type of dairy cattle one sometimes sees when travelling through the country.

Some Notes on the Springsure and Clermont Districts, July, 1938.

S. L. EVERIST, B.Sc., Assistant to Research Officer.

THE observations contained in this report were made during a visit to Springsure and Clermont in July, 1938. The primary object of the visit was to add to the existing fund of knowledge of the natural grasslands and to study the behaviour of the Mitchell grasses. In addition, observations were made on soil erosion, weeds and poisonous plants, and on the effects of ringbarking.

GENERAL NOTES.

At the time of the visit the country generally was in fairly good condition. Although in many places summer rain was rather scanty, good general rains fell in May and June, and these, followed by an unusually mild winter, produced a good body of herbage such as Carrot (*Daucus brachiatus*), Yellow Daisy (*Senecio lautus*), Bluebell (*Wahlenbergia gracilis*), Lamb's Tongue (*Plantago varia*), Bindy-eye (*Calotis hispidula*), Daisy Burr (*Calotis lappulacea*), Mustard Weed or Pepper Cress (*Lepidium saggitulatum*), and Fat Hen (*Chenopodium album*), and in some places Yellow Buttons (*Helichrysum ramosissimum*), Saltweed (*Atriplex Muelleri*), Crowfoot (*Erodium cygnorum*), Potato Weed (*Solanum esuriale*), various species of *Sida* and *Abutilon* and *Malvastrum spicatum*.

The black soil downs carry many different grasses, and at present grassland in the area under consideration appears to be rather unstable as regards its composition. In many places White Spear Grass (*Aristida leptopoda*) has assumed dominance, but this is a particular problem dealt with in greater detail later. Blue Grass (*Dichanthium sericeum*) is not so plentiful as it was some years ago, while grasses like White Spear Grass, Mitchell Grasses, particularly Hoop or Weeping Mitchell Grass (*Astrebla elymoides*), Yabila Grass (*Panicum queenslandicum*), Barley Grass or Wild Millet (*Panicum decompositum*), and Feather Top (*Aristida latifolia*) appear to be on the increase. At the time of the visit practically all the grasses had green leaves and young shoots. Numerous seedlings of White Spear Grass and some Weeping Mitchell Grass seedlings were also seen. This is unusual, but is almost certainly due to the very warm winter.

On the basalt tablelands and some of the red rocky ridges the principal grass is Desert Blue Grass (*Bothriochloa Ewartiana*), also known as Desert Mitchell and Tableland Mitchell. Its reputation as a fodder is fairly good, particularly for large stock. This grass was also shooting freely, particularly where it had been kept short by grazing or judicious burning (Plates 13 and 14).

Burning of grassland is commonly practised in the Springsure and Clermont districts, but there is some difference of opinion as to the merits and demerits of the practice. If allowed to grow unchecked, some of these grasslands reach a stage where the ground cover becomes almost complete. The grasses are tussocky in nature, but the stems spread so as to touch and intersect each other. At this stage the grass is 2 feet or more in height, with a large amount of dry material, such as dead stalks and leaves (Plate 11). In this condition it is difficult

Plate 11.

ORION DOWNS: EAST OF SPRINGSURE.—Part of black soil downs showing thick stand of White Spear Grass (*Aristida leptopoda*), with one plant each of Feather Top (*Aristida latifolia*) and Yabila Grass (*Panicum queenslandicum*). Grass not burnt and useless for stock.

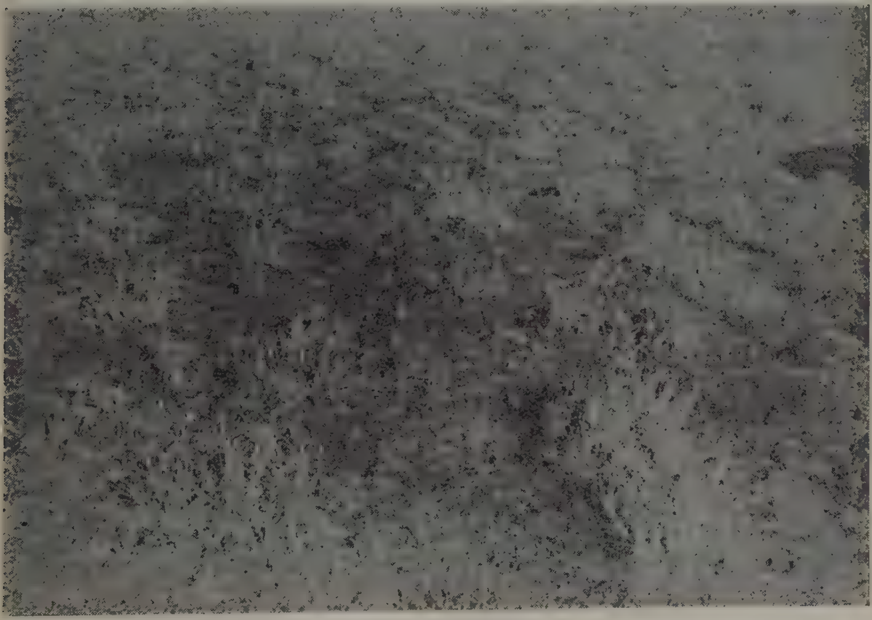


Plate 12.

ORION DOWNS: EAST OF SPRINGSURE.—Adjacent part of same paddock which has been burnt. Mostly White Spear Grass, with some Hoop or Weeping Mitchell (*Astrebla elymoides*), Feather Top, and seedlings of Yellow Drumsticks (*Craspedia chrysantha*). The Mitchell Grass has been heavily grazed.

to persuade sheep to enter the stand of grass, let alone eat it. Cases are know where sheep have died of starvation under such conditions and the rest of the flock has been saved only by hand feeding.

Under such conditions some means of reducing the density of the stand is essential if the country is to be utilised for grazing. Fire seems to be the best means of doing this (Plate 12) on large paddocks or rough country. For the small selector, mowing of suitable country may be more advisable as better control of storm rains would be obtained and there is less chance of the stalk destroying the more attractive grasses if grazing is allowed during the early stages of regrowth. Burning must be done with great care and at the proper time. Most people interviewed were of the opinion that it is best to burn in fairly narrow strips immediately after heavy rain when the ground is thoroughly wet. If that is done immediate growth results, and sheep will do well on the young growth of most of the grasses, with the possible exception of White Spear Grass, which seems to be unpalatable at all stages.

Plate 13.

BUCKLAND PLAINS: WEST OF SPRINGSURE.—Desert Blue Grass (*Bothriochloa Ewartiana*) on basalt tableland. Unburnt grass showing amount of dry stalk. Notebook near centre measures 5 inches by 6½ inches.

However, burning in a dry time or regular burning of the same area year after year will cause rapid deterioration. The coarser, less palatable grasses, such as White Spear Grass and Yabila Grass, take possession or else the ground remains bare and grows very little. A very hot burn, too, destroys many herb seeds and herbage is a very valuable constituent of the pasture.

Another important question is the effect of burning on soil moisture. In one instance holes were dug in adjacent burnt and unburnt areas, similar in soil, slope, and drainage. On the burnt area the soil was appreciably moist to a depth of 10 inches, on the unburnt area the moisture penetrated to a depth of 12 inches. This indicates that important differences may be the result of fire, particularly a very hot fire.

Much still remains to be done on the effect to burning on native grassland.

PROBLEMS OF THE SPRINGSURE DISTRICT.

At the present time the Springsure district presents four major problems to sheepmen, viz., dingoes, White Spear Grass, soil erosion, and Mint Weed. Dingoes, however, are outside the writer's sphere of activity.

The White Spear Grass Problem.

White Spear Grass or White Seed (*Aristida leptopoda*) at present appears to be troublesome only on the open black soil downs and alluvial flats, though there is some evidence that it is spreading to the slopes and tops of the low basalt tablelands. The grass is native to Queensland, but according to some local residents, first made its presence felt in 1914-15, following severe droughts. From that time on it has gradually become more serious until to-day it is a major menace to sheep raising in the district. As a matter of fact, one large holding has reverted to cattle because sheep could no longer be raised successfully on the Spear Grass.

Plate 14.

Part of same paddock burnt December, 1937, showing green shoots on Desert Blue Grass. Grazed.

During the course of the writer's visit a good deal of attention was paid to the plant. The grass itself is a densely tufted perennial, very like the Mitchell Grasses in habit, and possessing the same power of resistance to drought. The rootstock is composed of short, much-branched rhizomes, clothed in hard scales and bearing numerous buds. The buds, too, are wrapped in layer upon layer of hard, brown scales which protect the young shoots from dessication by drought. These buds are produced at from ½ to 1 inch below the surface of the soil. The leaves are long, narrow, and taper to a fine point. They are frequently produced in tufts some distance above the ground and give the plant a very characteristic appearance. They are fairly hard, and appear to be unpalatable to stock, even when quite green. The seed head is a slender, spreading panicle, each branch of which bears two spikelets or "seeds" near the end. These "seeds" each have three bristles or awns on the top and a sharp, hairy point at the base.

The grass is a pest in two ways:—

1. It is aggressive in its growth and unpalatable to stock, therefore the more palatable grasses are grazed, leaving the unpalatable White Spear Grass to take possession of the country. It is also spread rapidly by wind.

2. The seeds themselves are dangerous to sheep. They are capable of penetrating the wool, skin, and even the flesh. Sometimes they also enter the eyes and render sheep blind. The seeds are not quite so bad in these respects as those of the Black Spear Grass or Bunch Spear Grass (*Heteropogon contortus*), but this latter grass has the saving grace of being very palatable and nutritious in its early stages.

Reasons for Infestation by White Spear Grass.

Many theories have been advanced by graziers to account for the spread of the grass. The principal ones are:—

1. *Overstocking with Sheep.*—A visit to properties grazed solely by cattle and horses showed that the grass is just as dense there as on adjoining sheep properties. Sheep, then, are evidently not primarily responsible for infestation, though they may be a contributing factor. Nevertheless, overstocking with any class of stock will encourage the grass since the more palatable grasses are eaten out, leaving the unrelished ones to seed and eventually become dominant. The presence of White Spear Grass is not necessarily evidence of overstocking, since lightly stocked properties are also infested with it.

2. *Burning.*—Again, places which have never been burnt show as heavy a growth of White Spear as those which have been burnt. However, it is believed that regular burning or burning at the wrong time would encourage the grass. It is fairly resistant to fire, and, since the young growth resulting from a burn is less palatable than the good grasses, selective grazing would encourage the White Spear Grass.

3. *Drought.*—Drought appears to be an important factor in the very rapid spread of this grass. When a serious drought occurs the ground becomes bare. White Spear Grass germinates readily and rapidly and is also carried easily by wind. If, therefore, climatic conditions following the breaking of a drought should favour the germination of White Spear Grass, selective grazing of other grasses such as Blue Grass (*Dichanthium sericeum*) which would germinate under the same conditions, would result in a preponderance of White Spear Grass.

4. *Soil Erosion.*—One individual interviewed by the writer suggested a theory which might repay investigation. His theory is this: Prior to the droughts at the beginning of this century, the downs soils were loose and very rough on the surface. Blue Grass flourished. During the droughts much of this rough surface soil was swept away by wind, and when the droughts broke in a deluge, as they usually did, more of it was washed away. The top soil contained most of the Blue Grass seeds, whereas White Spear Grass seeds were blown in from the east during and after the droughts. Blue Grass, too, did

not grow so readily on the harder surface left after the dry times and White Spear Grass flourished. He believes that the White Spear is gradually building up the texture of the surface soil to its original state, and that there is a possibility that the grass will eventually become less aggressive. It is possible, of course, that the occurrence of White Spear Grass is simply a stage in a natural succession and it may eventually give way to other grasses. Time alone will tell.

5. *Wind.*—Wind is a very important factor in the dispersal of White Spear Grass. The whole inflorescence breaks off readily and can be blown for considerable distances. The seeds have been observed piled up against houses, woolsheds, and fences. One resident of the Springsure district suggested that the grass may have come in from the Comet River country with the prevailing north-east and south-east winds. He bases his statement on the fact that the eastern properties were the first in the district to be affected and that along belts of timber and fences the inflorescences are piled up against the eastern side. If possible, a good plan is to leave a belt of standing timber on the eastern side of open downs areas.

Control of White Spear Grass.

The control of this grass appears to be difficult and constitutes a serious problem. Stocking with cattle has been suggested, but appears to be of no value in view of the fact that some cattle country is as heavily infested as that grazed by sheep. Burning only serves to increase the spread of the grass as outlined above. The result of spelling has not been observed, and it would be interesting to see what effect the removal of animals would have on the grass.

Some control appears to be possible by the use of Hoop or Weeping Mitchell Grass (*Astrebla elymoides*). Where this grass has become established it appears to be gradually ousting the White Spear Grass. Unfortunately, in the Springsure district Weeping Mitchell Grass is not relished by sheep except when very young. In some places occasional burning is practised. The burn must take place after heavy rain when the ground is thoroughly wet, otherwise little or no growth results and the grass eventually dies out. If, following a burn, the grass is kept fairly well grazed, sheep appear to do quite well on it. If allowed to grow big and coarse, sheep will not even enter the area it occupies.

Curly Mitchell Grass (*Astrebla lappacea*), which is much more palatable than the Weeping Mitchell, is growing only in isolated patches in the Springsure district, despite the fact that on some properties it has been extensively sown. It appears to do best on soils such as alluvials which are rather lighter in texture than the heavy black soils of the open downs. Stock are extremely fond of the grass.

The above observations were all made in the course of a visit of about a week's duration. In such a brief space of time no definite conclusions could be reached and much still remains to be done on this serious problem.

The Soil Erosion Problem.

So far as the writer's observations go, soil erosion is more serious in the Springsure district than in most other districts in Western Queensland. A number of different soil types are affected, and erosion is due principally to water.

Plate 15.

SOUTH OF SPRINGSURE.—Erosion gully in old alluvium between two rocky hills. Trees are Silver-leafed Ironbark (*Eucalyptus melanophloia*). Shrubs are Budda or Sandalwood (*Eremophila mitchellii*). Gully about 6 feet deep.

Plate 16.

CALANDOON ROAD: SOUTH OF SPRINGSURE.—Erosion gully across black soil road; stones mark position of invert in road. Trees are Coolabah (*Eucalyptus coolabah*). Shows ease with which black soil erodes when water is allowed to flow in definite channel.

1. *Black Soil.*—The most striking evidence of erosion in the district is afforded by the deep gullying of the black soil and the consequent silting up of creeks. Due to its position at the northern end of the Carnarvon Ranges, much of the Springsure district is particularly liable to be eroded by water. Large quantities of water flow from the hills, often at considerable speed.

Gullying and sheet erosion have always taken place to some extent and the material has been largely redeposited in the rich alluvial flats along most of the creeks. In some places fairly well-defined alluvial fans are recognisable. However, observations over the last two years indicate that gully erosion is increasing rapidly. The black soil is easily washed away by water, and if, through drought or severe grazing, the surface becomes bare, nothing is left to hold the loose surface soil. Gullies are particularly serious near steep hills, and are most noticeable south of Springsure, towards the Carnarvon Ranges (Plate 16). In many cases the gullies have cut right through the soil to the underlying basalt.

The possible relationship of soil erosion to the spread of White Spear Grass has already been discussed.

2. *Ringbarked Country.*—Several types of country are commonly ringbarked in the Springsure district. The stony ridges which carry a mixed tree flora of Box (*Eucalyptus populifolia*), Wilga (*Geijera parviflora*), Bottle Tree (*Sterculia rupestris*), Bonewood (*Macropteranthes Leichhardtii*), Holly (*Heterodendron diversifolium*), Boonaree (*Heterodendron oleæfolium*), Quinine Bush (*Alstonia constricta*), Budda or Sandalwood (*Eremophila mitchellii*), Emu Apple (*Owenia acidula*), and other trees with a fairly dense undergrowth of Currant Bush (*Carissa ovata*), appear to be fairly stable, due to the great number of large stones embedded in the surface soil. The proportion of edible trees is fairly large so that a good deal of standing timber is left even after the useless ones have been ringbarked. Brigalow (*Acacia harpophylla*) scrubs also appear to be fairly stable since most of them have the typical soil pockets known as gilgais which serve to hold the water and prevent excessive run off.

The soil types most threatened by erosion are the red soils sometimes found along creeks and the red sandy soil ridges which adjoin the poor, white sandstones hills east of Springsure.

When the timber is removed, the red soil creek flats tend to form claypans. At one place near Springsure a striking example of erosion of this type was studied. Along one bank of the creek is a narrow strip of timbered country. The strip is situated along the western edge of an area of open downs and is an old alluvial flat. The principal trees and shrubs are Silver-leafed Ironbark (*Eucalyptus melanophloia*) and Budda or Sandalwood (*Eremophila Mitchellii*) with a thin but fairly stable ground cover consisting principally of Slender Wire Grass (*Aristida gracilipes*), Wire Grass (*Aristida ramosa*), Bindyeye (*Calotis hispidula*), Feather Top (*Aristida latifolia*), Minute Grass (*Tripogon loliiformis*), Small Burr Grass (*Tragus biflorus*), Spider Grass (*Chloris acicularis*), Tall Chloris (*Chloris ventricosa*), Small Blue Grass (*Dichanthium affine*), Bunch Spear or Black Spear Grass (*Heteropogon contortus*), *Eragrostis falcata,* and Cotton Bush (*Kochia tomentosa*) (Plate 17). Some of these are present only as isolated plants. For example, there is not sufficient Black Spear Grass to cause trouble with sheep. This strip of country is particularly valuable, especially when

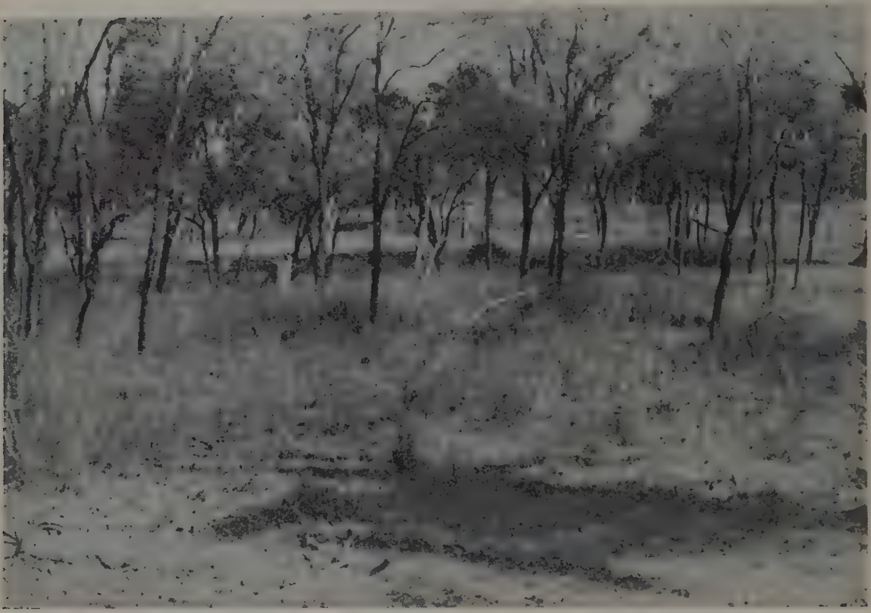


Plate 17.

ORION DOWNS: EAST OF SPRINGSURE.—Red alluvium with Silver-leafed Ironbark (*Eucalyptus melanophloia*) and Budda or Sandalwood (*Eremophila Mitchellii*), and ground vegetation of Wire Grass (*Aristida ramosa*), Small Blue Grass (*Dichanthium affine*), Small Burr Grass (*Tragus biflorus*), Bindyeye (*Calotis hispidula*), Minute Grass (*Tripogon loliiformis*).

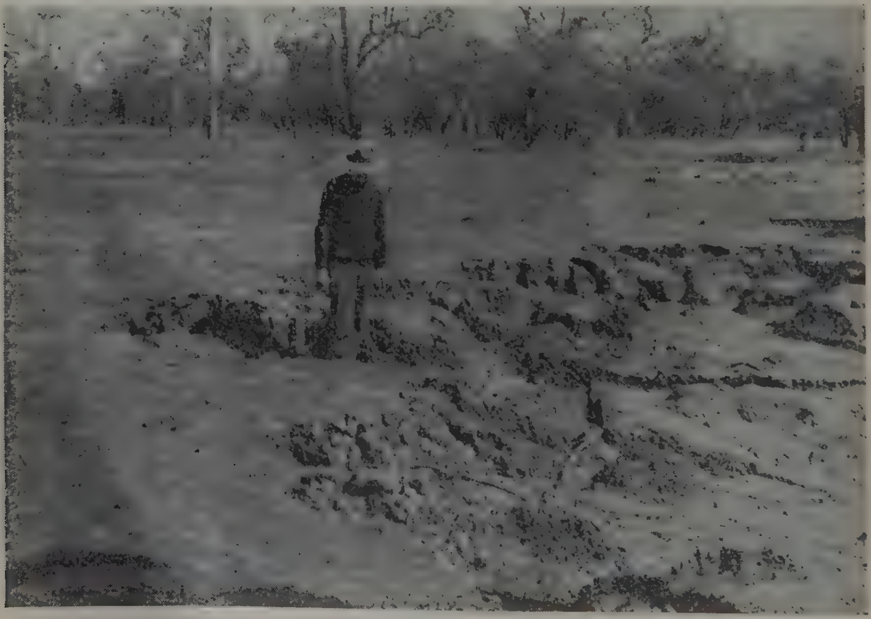


Plate 18.

Same place as Plate 17. Open patch showing erosion gullies, also smooth surface on left due to sheet erosion.

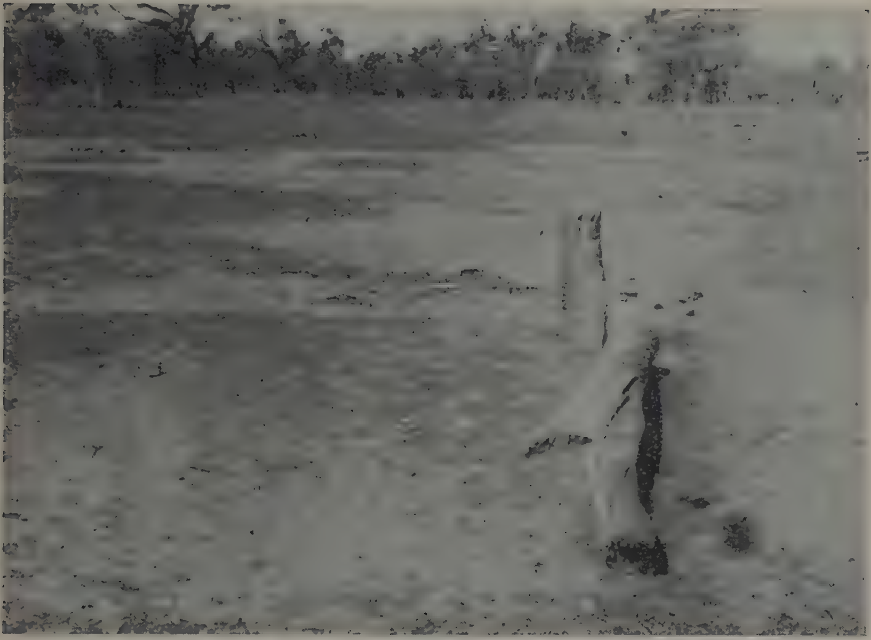


Plate 19.

Same class of country as Plate 17, showing effect of clearing. Light-coloured patches are bare ground, darker patches sandy areas carrying Minute Grass, Bindyeye, Bluebell (*Wahlenbergia gracilis*) and Young Galvanised Burr (*Bassia Birchii*). Note how log has held the soil. Timbered country in background represents original condition of this area.

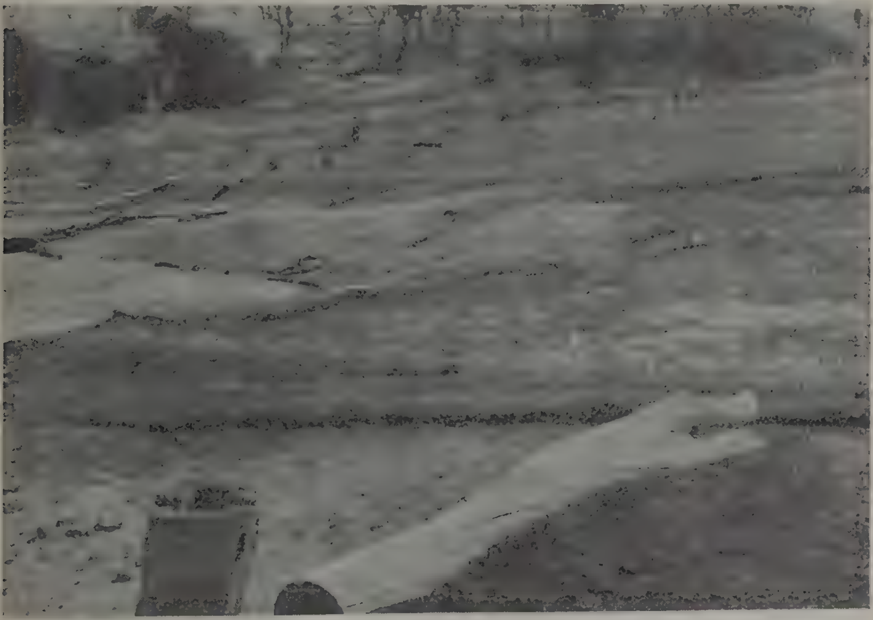


Plate 20.

Same as above. Same log in foreground, showing gullying of creek banks opposite cleared area.

lambing ewes are in the paddock, because the ewes get into it and escape the White Spear Grass on the downs country. In addition, the trees provide good shade.

In some places the timber has died, most probably through drought, and in these places sheet and gully erosion have commenced (Plate 18). They do not extend for any distance into the living timber.

The strip extends into an adjoining paddock, portion of which was cleared to provide wind for a mill. Where the timber has been removed the surface is mostly hard and smooth like a typical claypan with occasional patches of looser soil growing some Minute Grass, Bindyeye, Bluebell (*Wahlenbergia gracilis*), and Galvanised Burr (*Bassia Birchii*) (Plate 19). The surface is from 1 to 2 inches lower than that of the adjacent paddock where the timber was left standing. The bare area described above was formerly thickly infested with Galvanised Burr, but this was all removed. This year there is a good deal of young growth.

Evidence of the difference in run off is provided by the creek bank itself. Between the old alluvium and the present creek bed is a terrace about 20 to 30 feet wide and about 6 to 10 feet below the level of the timbered strip. Opposite the uncleared area this terrace and the banks remain intact, opposite the cleared area both terrace and bank are deeply gullied (Plate 20).

East of Springsure adjoining the ranges is a type of forest developed on a red soil. The surface readily breaks up into a fine sand and this soil is very susceptible to erosion by both wind and water.

The forest consists of a heterogeneous mixture of Belah (*Casuarina lepidophloia*), Box (*Eucalyptus populifolia*), Cypress Pine (*Callitris glauca*), and Silver-leafed Ironbark (*Eucalyptus melanopholia*), with a lower story of Budda or Sandalwood (*Eremophila Mitchellii*), and scattered Quinine Berry (*Petalostigma quadriloculare*). In its natural state the forest is practically a closed formation, and ground vegetation is negligible.

When the Belah, Box, and Ironbark are ringbarked, a dense cover of ground vegetation appears. This consists chiefly of Black Spear Grass (*Heteropogon contortus*), Tall Chloris (*Chloris ventricosa*), Wire Grass (*Aristida ramosa*), Purple Daisy (*Brachycome* sp.), Flinders Flea (*Stachytarphæta*), *Brachiaria piligera,* and *Rhagodia linifolia* (a saltweed). In some areas where the undergrowth was rung in addition to the larger trees, wind and water have removed a good deal of the surface soil and have either polished the surface or produced gullies. In any case the stand of herbage and grasses has been much reduced. In the open spaces, too, Currant Bush (*Carissa ovata*) is spreading rapidly. In the areas east of the Dividing Range Currant Bush does not appear to be grazed to any extent, and it is capable of forming a barrier almost impenetrable to sheep, cattle, and sometimes horses.

The Mint Weed Problem.

Mint Weed or Wild Sage (*Salvia reflexa*) appears likely to become a very serious pest in the Springsure district. Apart from the fact that it spreads rapidly and renders much land practically useless, Mint Weed is poisonous, and constitutes a potential danger to travelling stock. Paddock stock rarely, if ever, eat the plant, or if they do, they do not get sufficient to cause trouble. However, empty sheep, particularly those unloaded from trucks and then driven, are very susceptible to plant poisoning. Losses among such sheep have already occurred.

Mint Weed is an annual and appears to flourish on bare areas, particularly after winter rains. It seeds very freely and the seeds appears to germinate very readily. The plant is easily removed by chipping, but such large areas are now infested that its removal by this means would be very costly.

PROBLEMS OF THE CLERMONT DISTRICT.

The Clermont district appears to be less threatened than the Springsure area although White Spear Grass is troublesome in places. Mint Weed does not seem to have reached the district as yet. Soil erosion is less active than in the Springsure district, though some of the black soil downs are gullied.

Plant Poisoning.

One of the principal problems in the Clermont district is loss by plant poisoning. The writer was informed that many sheep are lost each year from this cause, particularly after winter rains. A number of plants may be responsible. During his visit the writer saw plants of Thorn Apple (*Datura Leichhardtii*), Darling Pea (*Swainsona galegifolia*), Caustic Creeper (*Euphorbia Drummondii*), Ellangowan Poison Bush (*Myoporum deserti*), Fuchsia Bush (*Eremophila maculata*), Prickly Poppy or Mexican Poppy (*Argemone mexicana*), and the so-called Red Poppy or Red Bottlebrush (*Pimelea hæmatostachya*). Each of these plants has been either proved or is suspected of poisoning stock at different times.

Paddocks on one property where newly introduced rams are consistently lost were examined and found to contain fair quantities of Darling Pea and Red Poppy. In addition, one of the paddocks contained Ellangowan Poison Bush and Prickly Poppy. Caustic Creeper is said to be frequently present although none was seen at the time of the visit.

On another property where sheep are lost fair quantities of Darling Pea and Red Poppy were present in the paddock concerned.

Grass Problems.

A grass which threatens to become a pest in some parts of the Clermont district is Yabila Grass (*Panicum queenslandicum*), also known as Star Grass, Umbrella Grass, Windmill Grass or Blow-away Grass, names loosely applied in Western Queensland to grasses having a spreading seed head which breaks off at the base and blows away. The name Yabila Grass is worthy of note. So far as is known, this is the first time the name has been put on record. The name was given to the writer by Mr. Gillespie of Orion Downs in the Springsure district, who assured him that it is a genuine native name.

Yabila Grass is a densely tufted perennial growing to a height of about 2 feet or sometimes more. It grows vigorously and seeds freely, and appears to be fairly drought resistant. Stock generally avoid it, except when very young. In many places it has nearly replaced the Blue Grass. It is not so serious a pest as White Spear Grass because the seed is not at all dangerous to sheep. However, it is worthy of notice as a potential danger to the pasture on account of its vigour and unpalatability. Burning appears to favour the spread of this grass.

CONCLUSION.

In addition to the above data much information was collected on the behaviour of the native grass species, particularly the Mitchell Grasses. This has been added to the information already collected in other parts of Western Queensland.

In conclusion, the writer wishes to express his sincere gratitude to the many people who, sometimes at considerable inconvenience to themselves, co-operated in the course of this survey of the two districts.

Plate 21.

A Road through the Rain Forest on the Eungella Range, near Mackay, Queensland.

Pig Raising.

By OFFICERS OF THE PIG RAISING BRANCH.

THE pig industry of Queensland provides an important part of the State's rural wealth, the total value of the annual production in recent years, after processing for fresh and frozen pork and cured bacon and ham, has approached £2,000,000. The true value of the industry is only visualised, however, when it is realised that so far, pig raising is conducted primarily for the purpose of disposing of by-products of other industries, particularly milk by-products from the butter and cheese industries, which have limited values in other directions, but can be economically converted into good quality pork.

The existence of the pig industry depends upon suitable food supplies, and in Queensland, although the pig industry is spread over a large area, the far northern and the most southern bacon factories being more than 1,000 miles apart, a relatively small part of the State is devoted to pig raising. Pig raising is confined to the dairying and agricultural areas along the coast, and at present approximately 85 per cent. of the pig population of the State is within a 200 miles radius of Brisbane.

The annual pig crop during recent years has been around half a million pigs slaughtered for pork and bacon within the State, and the number is increasing, although the annual crop fluctuates according to seasonal conditions which affect the food supply.

There is scope for greatly increased production of pigs, but any increase is dependent upon further food supplies, which could be provided by increased cultivation of fodder crops for pigs and increased milk production, which in turn is dependent upon improved pasture management, increased production of fodder crops for dairy cattle, and the conservation of fodder and water to smooth out the seasonal fluctuations in the production of milk.

Even with the present milk supply more pork could be produced by the use of greater quantities of fodder crops, and by distributing the available milk to larger numbers of pigs, or by substituting meat-meal for milk as the protein-rich part of the diet.

Climatic and soil conditions in Queensland's agricultural areas are very suitable for the production of numerous crops which provide good pig food. The long grazing seasons and moderate temperatures are conducive to profitable pig production.

MARKETS AND MARKETING.

Before commencing to produce an article for sale it is wise to ascertain if there is likely to be a market for that article; it is therefore in order to deal with existing markets and their present requirements, but it is necessary to realise that market requirements change with time, and producers must be prepared to make any alterations necessary in their commodity to meet changing consumer requirements; this is particularly important when there is competition among producers to supply a crowded market.

Australians are not big pork eaters in comparison with people of other countries; in fact, we eat less pig meats per head of population than most nations.

Queensland produced in recent years approximately one-fourth of the total pigs slaughtered in the Commonwealth. As Queensland's human population is only about one-seventh of the Commonwealth total this State has a larger surplus of pig meats than any other. This surplus is disposed of partly in the form of cured bacon and ham sold to the other States, some cured bacon and ham is exported to the East and to the islands of the Pacific, but the increasing surplus is being exported to the United Kingdom in the form of frozen porker and baconer carcases and pieces. Queensland is now supplying approximately one-half of the total frozen pig meat export to the United Kingdom from Australia.

The United Kingdom is the worlds largest importer of pig products, and Australia looks to this market as the logical outlet for its surplus pork. During the past seven years there has been a rapid increase in this trade with the United Kingdom until it has now reached a stage where the prices paid for pigs in Australia are largely influenced by the United Kingdom market. Since this effect has become more evident there has been greater stability of prices for pigs in Australia than was previously experienced. This stability gives the producer greater confidence in the pig industry, and is therefore conducive to increased production

The policy of the United Kingdom Government is to foster home production of pig meats and to give preference to Empire imports over foreign imports. Also it has legislated for the control of the home pig industry so that prices of bacon may be regulated, and the whole industry stabilised; Australia therefore does not contemplate restricted markets until pig production in Australia has reached a much greater volume than at present.

The local, interstate, and overseas markets provide for the disposal of good quality pigs of both porker and baconer weights, but when it is realised that the United Kingdom is the most obvious channel for marketing the increasing quantities of pig meats which are being produced in Queensland, special consideration should be given to the following resolution of the Australian Meat Board, published in November, 1937:—

> "That the board considers that the best way to export pig meats from Australia to the United Kingdom is in the form of frozen baconer carcases and pieces suitable for the manufacture into bacon and hams, and recommends accordingly to producers."

A study of pig prices in Queensland over a number of years indicates a seasonal trend of prices which reach their peak in the Spring and then fall rapidly until they reach their lowest in the Autumn; this is the result of the pig industry's reliance on milk, the production of which fluctuates with the seasons. In 1929 and for a few years previous, prices averaged about 7d. per lb. dressed weight for prime baconers on Queensland railways. Then, with the fall in world values for practically all primary products there was a sharp decline in pig values in the years 1931, 1932, and 1933. Since 1933 pig prices have increased to an average of around 5½d. per lb.

Most districts in Queensland where pig raising is well established are well provided with marketing facilities. Large bacon factories or meatworks are established at Brisbane, Toowoomba, Warwick, Maryborough, Gladstone, Rockhampton, and Mareeba. Each of these establishments treats pigs for local requirements, and most of them engage in the treatment of pigs for export. In most districts there are also smaller butchering establishments which treat pigs for local requirements.

Some of the organisations treating pigs arrange regular truckings either weekly or fortnightly from country railway centres, when pigs are sold either "over the scales," before trucking, on an estimated dressed weight basis, or on consignment to the works, when they are paid for after slaughter on their actual dressed weight.

Auction sales of pigs are conducted at Brisbane and several other large marketing centres, while practically all operators are prepared to accept pigs "on consignment" at the works direct from growers.

Prime baconer and porker pigs are readily saleable, but unfinished or excessively fat pigs are usually sold at a discount. Mature sows which are not in pig, but in prime condition, are classed as backfatters and find a good market; stags and rough quality pigs are not in very keen demand on most markets. Weaners and store pigs are traded fairly extensively at the larger auction markets, and also privately between producers. The demand for these two classes of pigs is irregular, fluctuating with the seasons and the food supply. Most successful pig raisers prefer to breed and then finish their own pigs, rather than purchase stores, because of the risk of introducing disease, and because store pigs are usually too expensive when in demand.

All pigs slaughtered for sale are submitted to inspection by Government meat inspectors, whose duty it is to satisfy themselves by examination, that each carcase is free from disease, and is fit for human consumption, any diseased carcase or part thereof being condemned. Pigs slaughtered for export from Australia are inspected by Commonwealth meat inspectors, who also grade carcases; any carcase not complying with export standards is rejected, though not necessarily condemned. Export standards are severe, and many carcases are rejected because of some slight blemish which could have been avoided by more care being exercised in growing and marketing those pigs. With the growth of the export trade the problem of disposing of rejected carcases will become more acute, and it is therefore necessary for producers and those handling pigs in transit to exercise greater care in order to avoid what could become a burden on the pig industry.

For the purpose of identification of ownership so that the seller of the pigs may be made to bear any loss of condemnations, and be credited with the gradings of his pig carcases, it is required by the Pig Industry Act of 1933 and Regulations thereunder that every pig offered for sale, and every pig consigned to a slaughtering establishment, must bear a mark of identification. Pigs consigned to works or factories are mostly branded with the body tattoo, which is an efficient brand for identifying carcases, but is not always visible on live pigs; therefore, in cases where it is desired to identify the pigs immediately before as well as after slaughter, the fire brand is resorted to, as ear-marking and ear-tagging have not proved wholly satisfactory.

The difference between the price per lb. which the producer receives for his pigs, and the price he pays the storekeeper for a lb. of bacon is thought by some producers to be too great; it should, however, be realised that the price paid to the producer does not usually include freight to the works, and when pigs are delivered to the works by the producer an allowance is made for the freight. Further, a lb. of dressed pork does not make a lb. of bacon. The following is an account of what happens to a prime, unfasted pig weighing 200 lb. alive at a country railway yard. Weight is lost in the form of shrinkage and emptying of the digestive tract during transit to the works, and whilst resting at the works; then at slaughter the blood, hair, and viscera are lost, and the resultant carcase with head, feet, and flare still on, weighs approximately 145 lb. after cooling. In the process of bacon curing the head, feet, flare, backbone, and trimmings are removed, and drying occurs, resulting in approximately 110 lb. of cured bacon and hams being produced, which is 55 per cent. of the live weight of the pig.

The yield of carcase and the yield of cured meat vary considerably, and are not so high with light pigs as with heavy pigs, and are influenced also by the condition and conformation of the pigs, the amount of food they are carrying when first weighed alive, and the time elapsing before slaughter.

ACCOMMODATION AND EQUIPMENT.

In providing accommodation for his pigs, the farmer must consider the health and comfort of his stock, and plan to prevent disease as far as practicable; he must also consider his system of feeding and management, and bear in mind the class of pigs required by the pork and bacon trades.

During recent years the general demand has changed towards leaner meat, and pig-raisers are now endeavouring to produce pork and bacon pigs which have an abundance of lean meat and a minimum of fat; this, of course, necessitates a change of methods in breeding, feeding, and management.

Health in pigs is dependent on sound husbandry, one of the more important features of which is the provision of good accommodation. Investigations into disease in pigs have shown that certain rules in sanitation regarding pig accommodation will, if carried out, control most of the serious troubles which occur in pigs, particularly infestation by internal parasites.

Bearing in mind the most important feature of pig accommodation —namely, sanitation—there can be only two clearly defined systems of keeping pigs which are completely satisfactory; one is the grazing system, wherein pigs are kept on fresh pasture or crop land which is either rested, or cultivated and grazed in rotation; the other is the intensive system, in which the pigs are kept on impervious floors, such as concrete, which are properly drained and regularly cleaned. In both of these systems the object should be to keep the pigs on clean ground, or on a clean floor, for a good deal of the infection to which pigs are subject lurks on the ground or floor of pig pens which are not rested, or properly cleansed. In grazing pig paddocks in rotation the youngest pigs should be kept on the cleanest ground, as they are usually the more susceptible to infection.

Plate 22.
A scene on a Queensland Pig Farm where pigs are grazed on lucerne and paspalum.

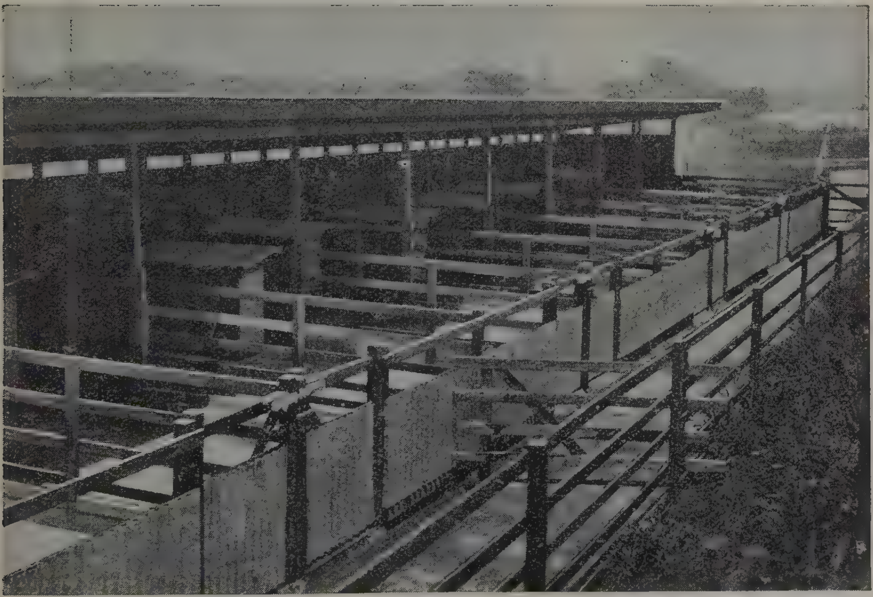


Plate 23.
Intensive Pig Pens of similar design to the drawings shown in Plate 50.

Where there is a sufficient area of good grazing land or cultivation land the grazing system has many advantages, and should be adopted, either entirely, or in combination with the intensive system. If sufficient paddocks can be cropped for the pigs to do the harvesting, the paddocks being ploughed a couple of times each year, infection will be kept at a minimum; the pigs will receive benefit from the exercise gained in grazing or harvesting their own food; a good deal of labour is saved in the harvesting of the crop, and the fertility of the land benefits.

On grazing land where cultivation is not practicable it is necessary to have sufficient paddocks of ample area to keep them always well grassed, and to enable the resting of the paddocks at frequent intervals. Pig paddocks should not be over-stocked so that they become bare, unless they can be cultivated or rested for several months. Even if pigs are paddocked as suggested, the ground near the troughs and sheds will become "pig sick" after a time, and so it is most desirable that such equipment should be movable. Sheds of convenient size should be provided in the paddocks to shelter the pigs from the extremes of the weather, and these sheds should be built on skids to allow of their easy transport about the paddock, or from one paddock to another. Food troughs and platforms, self-feeders, and water fountains should also be mounted on skids for easy transport.

With movable equipment and sufficient paddocks, there is no necessity for cleaning up with broom and shovel, and where pigs are kept on the grazing system the whole piggery is found to be free of noxious odours, which are usually associated with small pen piggeries; these features make pig-raising a much more congenial undertaking when the grazing system is adopted.

When the intensive system of pig-raising is adopted, impervious floors, and good drains are essential; a good supply of water and the necessary labour are also required to clean the pens daily. Intensive pens are necessarily small, and a portion of each pen is roofed to provide the pigs with shelter from the extremes of the weather. (See plan of intensive pig pens.)

In selecting a site for intensive pig pens, consideration should be given to the aspect, so as to provide shelter from the prevailing winds, and to make the best use of the early morning sun as a disinfectant and deodoriser inside the sheds; thus a north-easterly aspect will usually be found the most suitable.

A SUGGESTED LAYOUT.

The model piggery shown in Plate 24 suggests a layout which has proved very satisfactory where suitable cultivation or grazing land is available. This plan gives scope for cultivation and rotational grazing of paddocks with a view to providing a maximum of pasture for the pigs, and control of disease and parasites. The land in the centre of the runs, with a loading race at one end, and two movable hurdles, provides ample facilities for drafting pigs.

The usual fencing might be replaced by movable hurdles at the ends of the runs adjoining the lane, so that when paddocks are being cultivated implements may work right to the end of the run, for it is this portion around the troughs which becomes most fouled.

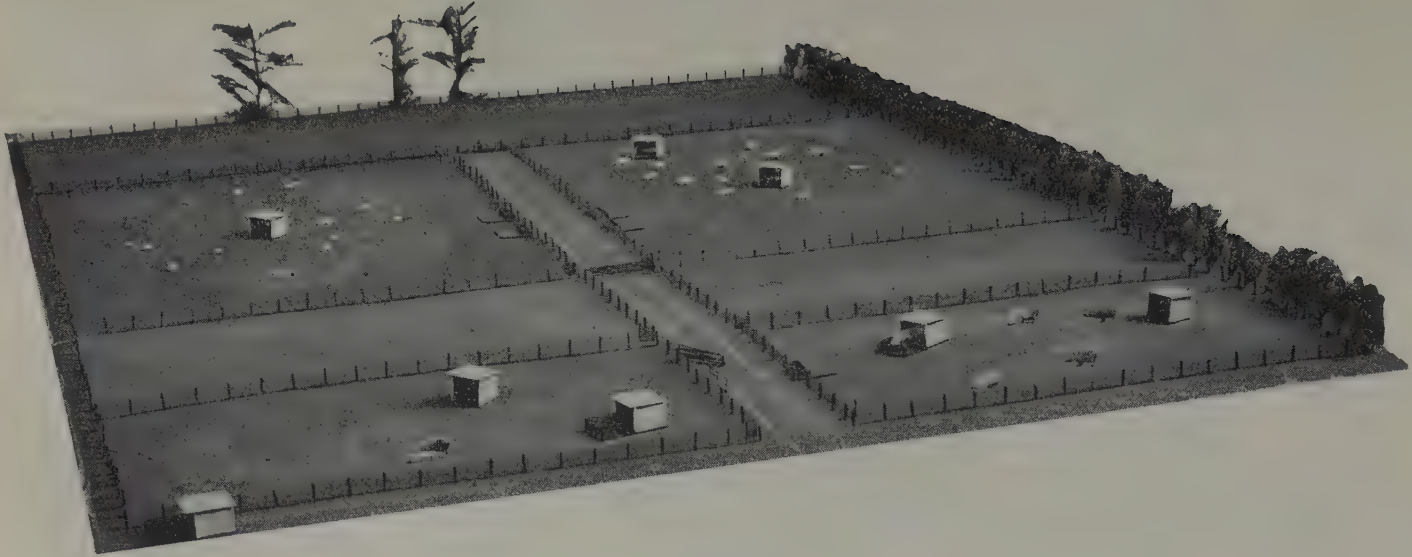


Plate 24.

MODEL PADDOCK PIGGERY FOR SIX SOWS, ONE BOAR, AND YOUNG STOCK.—The area is three acres, containing four small paddocks and three large ones, which allow for rotational grazing and resting or cultivation of the runs. The dry sows and the boar are kept in one paddock, sows with litters in another, and the younger litters in a temporary pen. The growing pigs are in two groups. No fattening pen is provided, as pigs bred to the right type finish well in paddocks.

The sheds are on skids and the troughs are built on platforms, which also rest on skids for easy transport.

The hurdles and loading race in the lane provide for easy handling of pigs, while the quarantine pen outside the main piggery is a safeguard for the control of disease.

It is not suggested that the pigs will obtain all their food from the 3 acres of grazing shown in the plan, and the grazing can only be expected to carry the pigs if other food is provided in addition.

Where the correct type of pig is bred, and feeding conditions are good, pigs may be kept in paddocks as suggested, from birth to slaughter, with excellent results.

On every farm where pigs are bred and reared a number of paddocks or pens is necessary, so that pigs of various classes and ages may be kept separately. Breeding sows when dry should be run in a separate enclosure from other pigs, and in some cases it is even desirable to run the forward sows separate from the backward sows. Dry sows will secure the greatest part of their food requirement from good grazing, and give best results when kept out in the open.

Plate 25.

W. F. Kajewski's Piggery, Glencoe, Darling Downs, where pigs are kept under grazing conditions, and movable sheds are provided for them. The long, narrow paddocks are cropped regularly, and the system has been working satisfactorily for some years.

The best results are obtained when sows with young litters are kept in individual enclosures, and as it is rather difficult on large piggeries to give each sow and litter a separate paddock large enough to be cultivated, the intensive pen is often resorted to for sows and young litters; however, the sows and litters may be kept separately on pasture by providing each one with a hut, to which are affixed three hurdles, making a small run (see Plate 29); the whole unit should be movable so that the pigs can be put on to fresh pasture as each patch becomes fouled.

Plate 26.
Movable Pig Pens on W. Dawson's Farm, Woolooga.

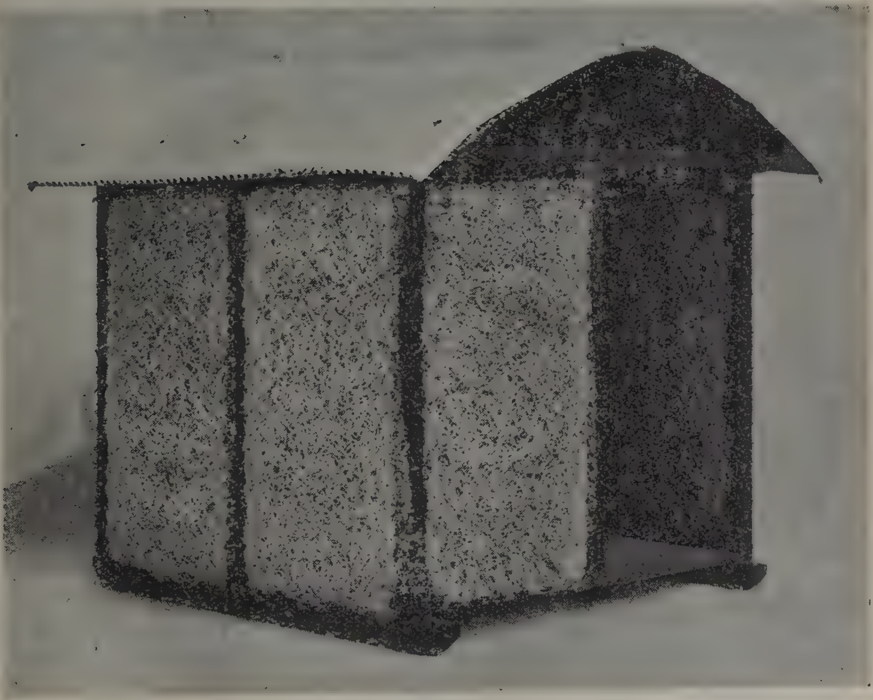
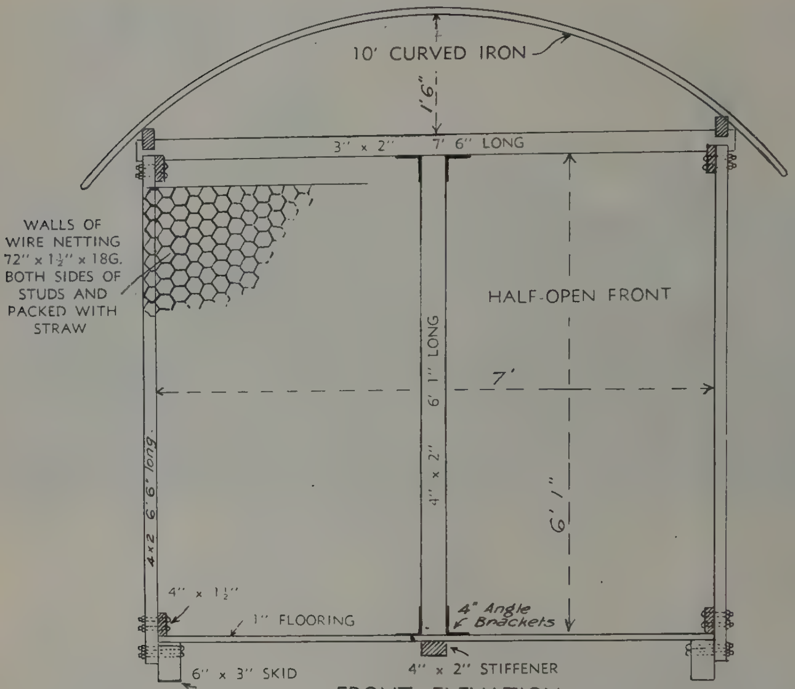
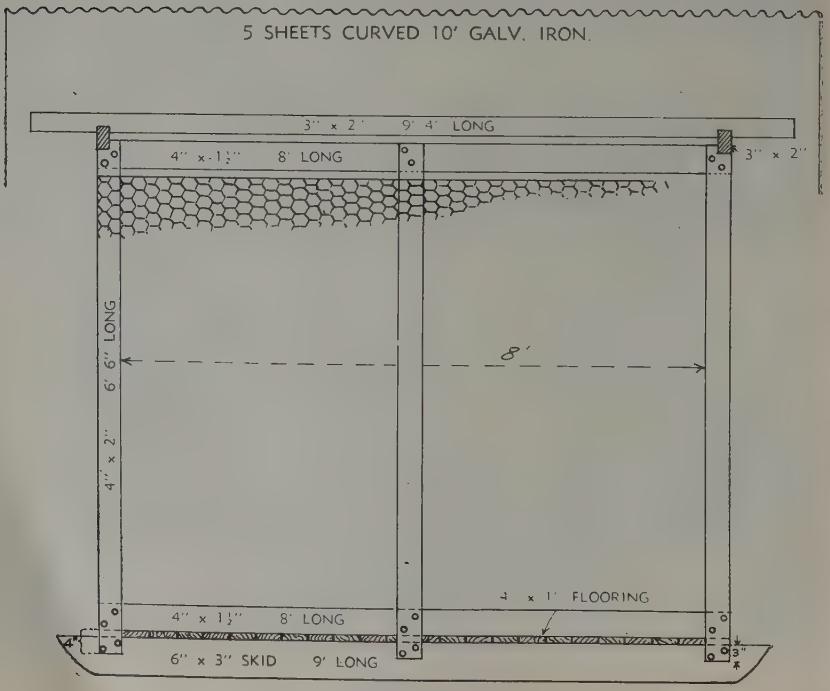


Plate 27.
Movable Shelter Shed with straw walls, as described in Plate 28.

MOVABLE SHELTER SHED FOR PIGS


10' CURVED IRON
1' 6"
3" x 2" 7' 6" LONG
WALLS OF WIRE NETTING 72" x 1½" x 18G. BOTH SIDES OF STUDS AND PACKED WITH STRAW
HALF-OPEN FRONT
6' 1" LONG 4" x 2"
7'
4x2 6' 6' long.
6' 1"
4" x 1½"
1" FLOORING
4" Angle Brackets
6" x 3" SKID
4" x 2" STIFFENER

— FRONT ELEVATION —


5 SHEETS CURVED 10' GALV. IRON.
3" x 2" 9' 4' LONG
4" x 1½" 8' LONG
3" x 2"
6' 6" LONG 4" x 2"
8'
4 x 1" FLOORING
4" x 1½" 8' LONG
4"
6" x 3" SKID 9' LONG
3"

— SIDE ELEVATION —

Plate 28.

MOVABLE SHELTER SHED.

The shed illustrated in Plates 27 and 28 is suggested for use in pig paddocks. Being built on skids the shed is capable of being moved about the piggery for convenience, and to maintain good sanitation.

Its floor space, 8 feet x 7 feet, makes it suitable for a sow and litter, about five dry sows, or twelve growing pigs. The height allows a man to enter freely, and provides for coolness in hot weather, thus obviating the need for shade in other forms.

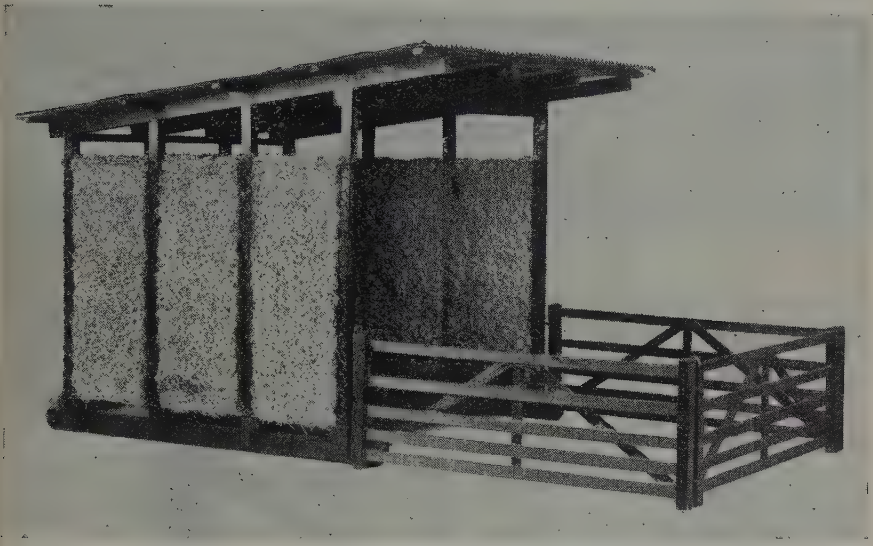


Plate 29.

When it is necessary to segregate the boar, or a sow with a young litter, or a few pigs being finished for market, the movable shed in the paddock can still be used by attaching hurdles as illustrated here, making a temporary pen.

The two features of this shed which should appeal to farmers are its ease of construction and low cost.

In building, the 4-inch by 1-inch flooring is laid across the 6-inch by 3-inch runners, each 9 feet long, and the 4-inch by 2-inch stiffener is placed along under the centre of the floor. The two sides are then made by bolting two 4-inch by 1½-inch by 8 feet plates across three studs 4 inches by 2 inches by 6 feet 6 inches, placing the bottom plate 4 inches from the end of the studs. The sides are then bolted to the skids as shown in drawings. Two pieces of 3 inches by 2 inches by 7 feet 6 inches are then fixed across the back and front as top plates, and checked on to the sides as shown. Centre studs 4 inches by 2 inches by 6 feet 1 inch are then placed in position at front and back of the shed, reaching from floor to top plates, and these are fixed using 4-inch angle brackets. A rafter 3 inches by 2 inches x 9 feet 4 inches is then set along each side and checked into position as shown, to carry the iron.

Wire netting 1½-inch mesh, 18 gauge, and 6 feet high is then fixed to the inside and outside of the studs, covering all the walls, except half the front, which is left open. Straw is then rammed tightly between the wire before it is nailed up at the top. This walling material provides good insulation against weather, is inexpensive, and keeps the shed light for moving. The roof consists of five sheets of 10-feet curved iron.

GUARD RAIL.

All farrowing houses should be fitted with a guard rail to prevent young pigs from being crushed against the walls. Experience has proved that the use of this rail has saved an appreciable number of young pigs. This rail can be constructed of 3-inch by 2-inch hardwood, 1-inch water piping, or saplings. It should be placed 9 inches above the floor and 7 inches from the walls.

FENCING.

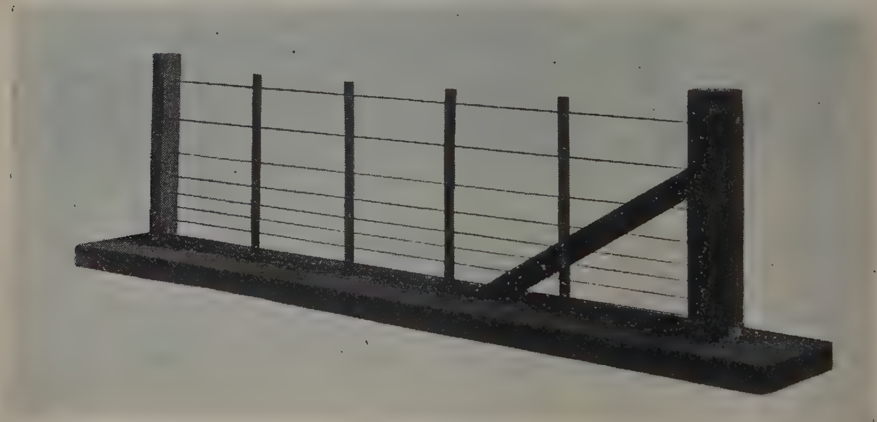


Plate 30.

This type of fencing will hold pigs over three weeks old, provided it is kept well strained. It is less expensive than comparable woven wire fences, and has the advantages of being easily repaired and strained by roller strainers at the end of each line.

The panel illustrated is 11 feet, the wires are spaced from the ground:—1 inch, 2 inches, 3 inches, 3 inches, 3 inches, 4 inches, 5 inches, 7 inches, 8 inches; the bottom wire is barbed and the others plain. The wooden droppers are stapled to the wires.

The "Electric Fence" has given satisfaction where tried, and has the advantage of saving a considerable amount of posts and wire where a large amount of fencing is to be erected. Where pigs are to be kept on the grazing system the "electric fence" is worthy of consideration.

Plate 31.

The two low-hung wires of this electric fence effectively hold small pigs in check on Mr. F. N. Walker's farm, Belmont, Queensland.

Plate 32.

Only one electrified wire is required for larger stock.

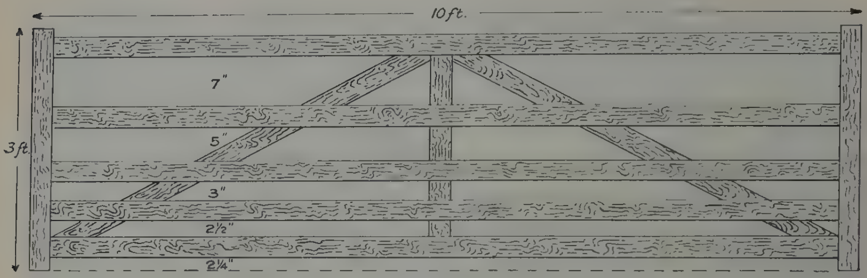


Plate 33.

Hurdle suitable for temporary penning; 3-in. by 1-in. battens are morticed into 3-in. by 3-in. end pieces.

Plate 34.

Trolley on wooden rails used for conveying separated milk from the dairy to pigs, on Mr. E. J. Reeve's property, Balgowan, Darling Downs.

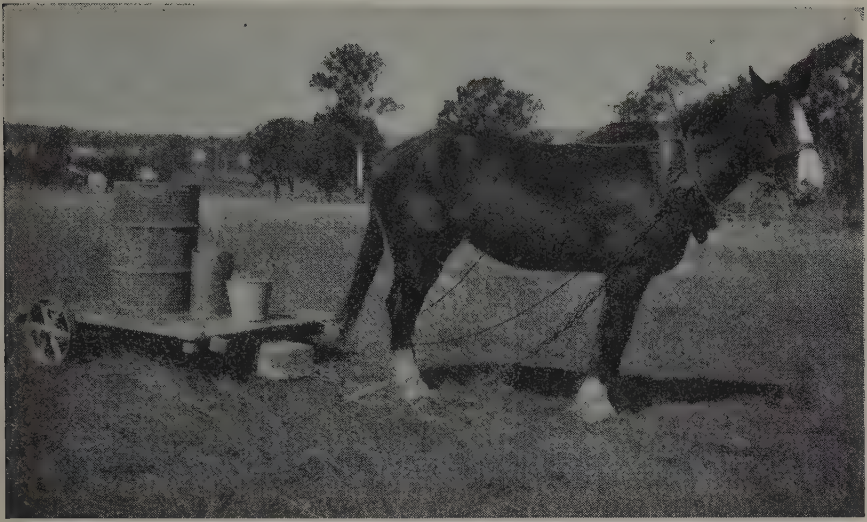


Plate 35.
A Good Feeding Outfit in Use on a Lowood Farm (Q.).

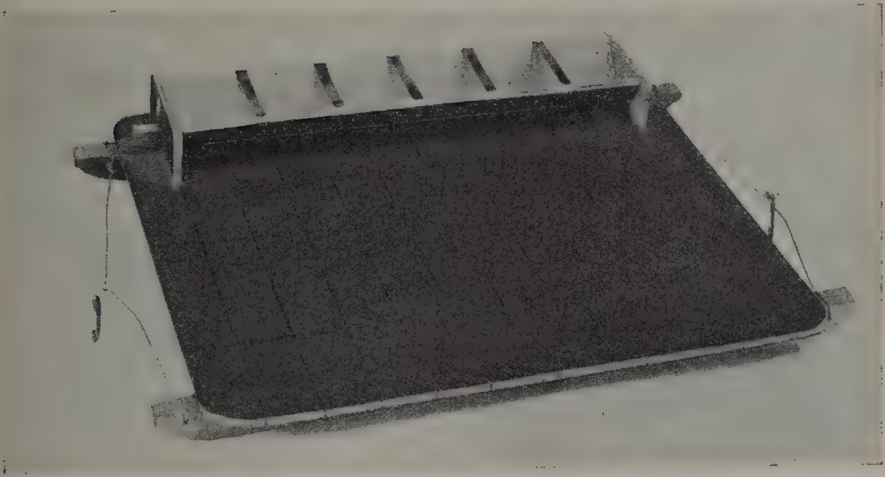


Plate 36.
Wooden trough on a movable floor, suitable for paddock use.

TROUGHS.

The piggery should be equipped with troughs of sufficient capacity to feed the pigs without undue scrambling or fighting at feeding time. An average space of 10 inches should be allowed for each adult pig. The trough should have the capacity to hold a full feed for the pigs.

Pig troughs should be strongly constructed, and have a smooth surface free from corners or cracks. Where portable troughs are used in a grazing piggery they should be of a size which allows of their being easily hauled on to clean ground. (See Plate 36.)

AUTOMATIC WATERER.

Plate 38 illustrates a watering device suitable for paddock use. A 40-gallon drum is set into a trough 6 inches deep, and the whole is fixed on to a slide. The drum has a ½-inch plug hole 1½ inches from its bottom, and a larger plug hole for filling at its top. The lower hole allows the water to flow out to a sufficient height to allow of the pigs drinking from the trough; and to fill the drum the bottom hole is plugged and the top hole opened.

SELF-FEEDERS.

Self-feeding of pigs is as yet little practised in Australia, because pigs are kept chiefly to utilise by-products, such as separated milk, which are not readily adaptable to self-feeding; but when the price ratio of grain and pork is such as to make the pig a profitable means of disposing of grain, pig-raising must be considered from a somewhat different viewpoint.

The grain-grower who keeps pigs but has no milk foods can make good use of his grain by feeding it in combination with such foods as lucerne chaff and meatmeal, both of which are substitutes for separated milk in the pig's ration. Such feeds as these are adaptable to dry-feeding through a self-feeder, whereby the pigs have several days' food supply placed in the feeder, and they are allowed to help themselves. Under certain conditions, self-feeding has many advantages and is worthy of trial.

ONE-WAY SELF-FEEDERS FOR PIGS—MATERIALS REQUIRED. (See Plate 37.)

Members.	Number.	Length.		Size.	Material.
		Ft.	in.		
Skids	Three	1	6	4 in. x 2 in.	Hardwood
Trough	One	4	0	6 in. x 2 in.	Pine
Trough	One	3	10½	12 in. x 2 in.	Pine
Trough	One	3	10½	4 in. x 2 in.	Pine
Trough	One	3	10½	8 in. x ¾ in.	Pine
Trough	One	3	10½	4 in. x ¾ in.	Pine
Front Panels	Five	3	10½	6 in. x ¾ in. T. & G.	Pine
Front Panels	Two	2	3	3 in. x 2 in.	Pine
Sliding and hinged flaps	Two	3	10½	4 in. x 3 in.	Pine
Ends and back	Twenty-four	3	3	6 in. x ¾ in. T. & G.	Pine
Ends and back	One	7	0	6 in. x ¾ in.	Pine
Top	Ten	2	4	6 in. x ¾ in. T. & G.	Pine
Top	Two	5	0	6 in. x ¾ in.	Pine

Hardware—Three 1-inch by ¼-inch iron straps.
Six 3-inch strap hinges.
Two 3-inch by ½-inch bolts with thumb nuts.
Nails, &c.

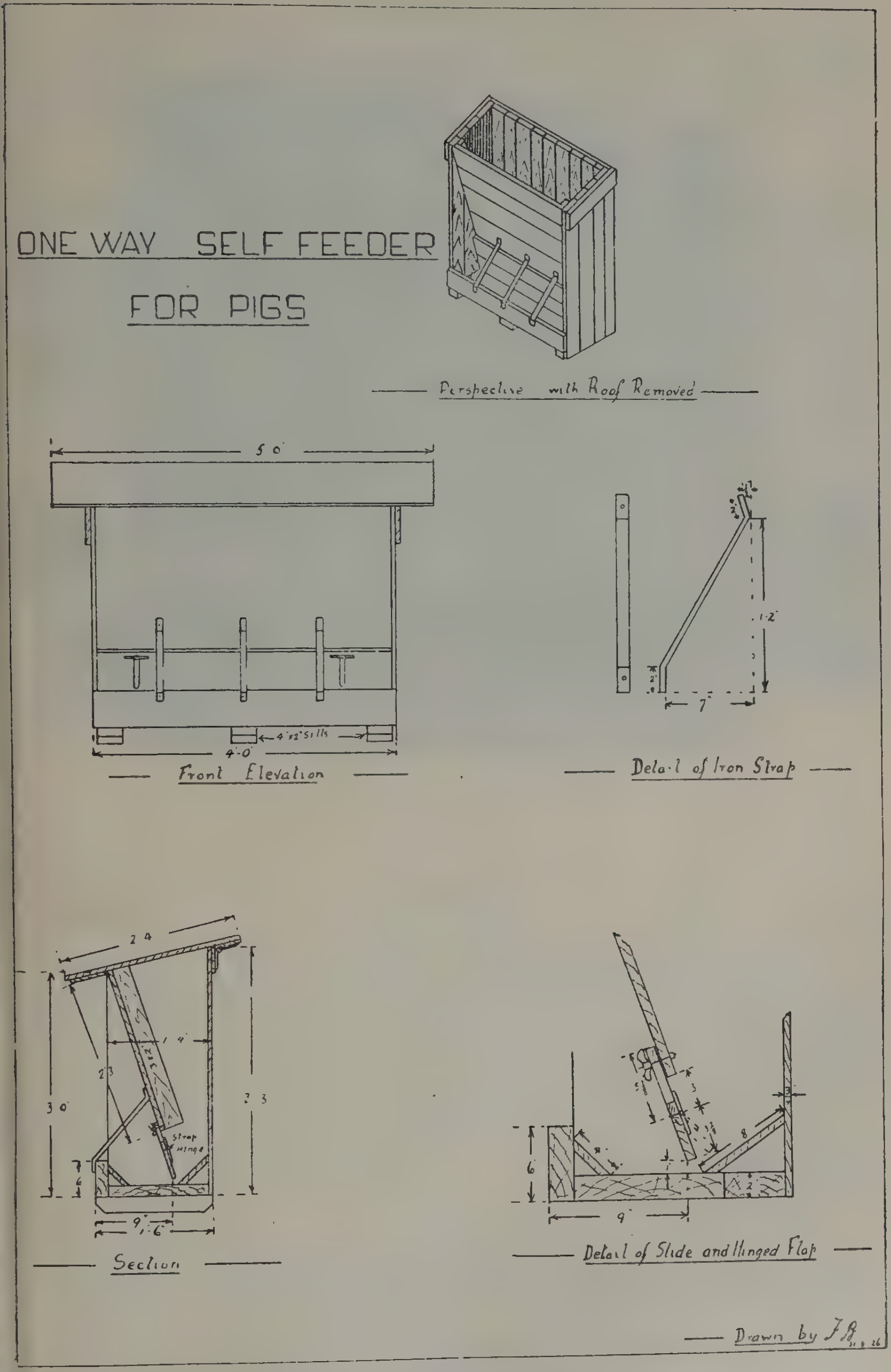

ONE WAY SELF FEEDER
FOR PIGS
Perspective with Roof Removed
5' 0"
4'x2" Sills
4'0"
Front Elevation
1'2"
2"
7"
Detail of Iron Strap
2'4"
1'4"
3x2
2'3
3'0"
2'3"
Strap Hinge
6
9"
1'6"
Section
6
3
8
2
9"
Detail of Slide and Hinged Flap
Drawn by J.B.

Plate 37.

Illustrating a type of self-feeder which has given satisfactory results in practice, and is large enough to feed twelve pigs.

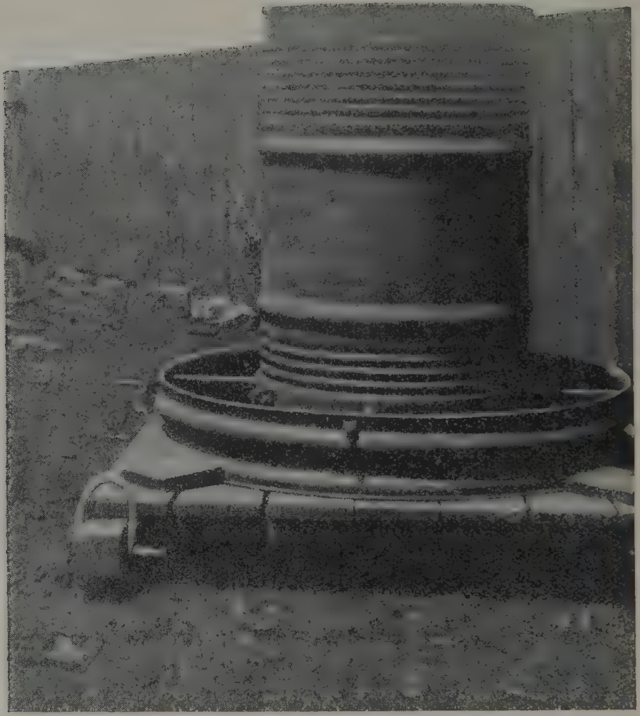


Plate 38.
Automatic Water Fountain suitable for pigs in paddocks.

LEGISLATION.

Pig-raising in Queensland is controlled by legislation under the Pig Industry Act, Dairy Produce Acts, Diseases in Stock Acts, and the Slaughtering Act, and the by-laws of city, municipal, and shire councils. While it is advisable, when about to construct or alter a piggery, to consult the authorities concerned, through the district inspectors under the Acts, it might be stated here that the general purposes of the legislation in force are to provide for health and sanitation on the premises where pigs are kept.

It is required by the Dairy Produce Acts and Regulations that pigs shall not be allowed within 150 feet of premises where dairy produce is kept; these include milking shed, separator room, and cream house.

A common method of transmission of tuberculosis from cattle to pigs is through the pigs having access to the dung of infected cattle; all pigs should therefore be kept out of cow paddocks and yards.

QUARANTINE PEN.

It is advisable to provide a quarantine pen some distance from other pens, where newly introduced pigs and sick pigs could be placed, and kept under observation. This is an important safeguard against disease.

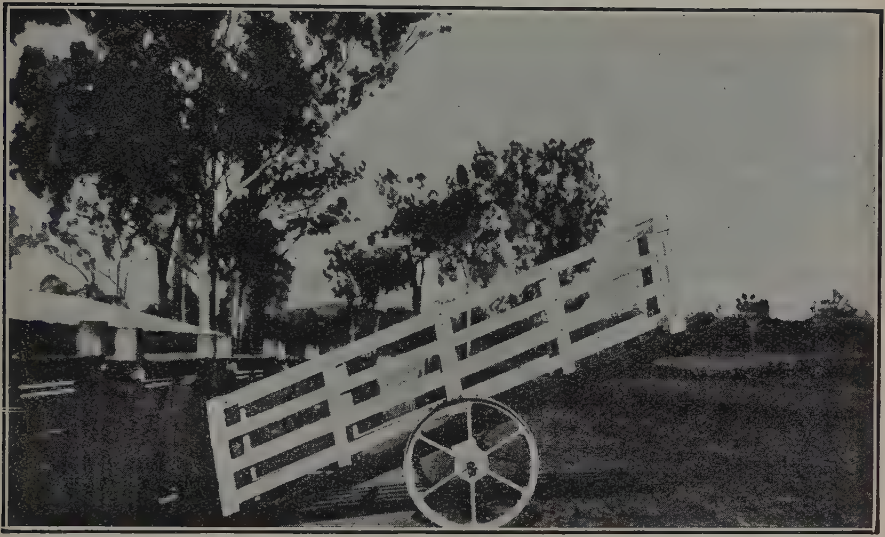


Plate 39.
A Useful Portable Loading Race.

FEEDING.

The ability of pigs to make economical gains in weight is determined by their breeding, management, and feeding. Well-bred, thrifty pigs that are well cared for, and kept in good health, will make the best use of the available foods. There are very few foods which pigs will not relish, provided they are wholesome. Decomposed foods should not be used. The pig's digestive tract is not designed for the consumption of large quantities of bulky foods; therefore, while a little roughage is desirable, concentrates should predominate in the ration.

In most circumstances, full feeding either by hand or self-feeder, is a wise practice, and, provided the animal receives a complete and balanced ration, and the necessary exercise, and is bred to the right type, it will produce a desirable carcase at the required weight; but if small-type pigs are being fed to bacon weights, limited feeding must be practised. While the nature and composition of a pig's food affects the proportion of fat and lean in the carcase, the inherited conformation, and the environment, are also important factors.

Up to the present, pigs have been kept in Australia chiefly to utilise by-products from other industries, more particularly the by-products of the dairy industry, and when such foods are available cheaply, they form the basis of pig-feeding rations. While pig-raising is dependent on other industries for food supplies, the selection of foods and the selection and preparation of rations will depend almost entirely on the availability of by-products; but when pig-raising is undertaken as a special business, then provision of a food supply is a different matter, and the selection of foods to be grown or purchased requires very keen attention.

The pig-raiser should know what quantity of food his pigs are using to make a pound of pork, and whether the value of that pork is sufficient to pay for the food, as well as labour and other charges. When foods have to be purchased, their cost must be considered as well as their feeding value, and their suitability when used in combination with other foods.

Food is usually given to animals with the object of producing growth, work, milk, &c., but before any of these can be produced the animal body must be maintained, i.e., the body heat must be kept up, waste tissue must be replaced, and the necessary energy for the movement of body muscles must be supplied. Approximately half the food given to a young pig is used for maintenance before any growth can be expected; this explains why the quicker the animal is grown, the less the amount of food used for maintenance.

The growth of young animals is dependent on a supply of food in excess of a maintenance allowance, and with pigs, this is perhaps the most important object in feeding from the practical viewpoint, for, having produced the young pigs, the farmer's object is to grow them rapidly and as economically as possible.

In mature breeding stock, food is used not only for maintenance, but for the production of young. After the birth of the young, the sow has to secrete milk to feed them for a couple of months. This means an extra call on her body, which must be supplied with the necessary food. Protein-rich foods are essential for the production of muscle and milk, and carbonaceous foods and fats are used for the production of fat, heat, and energy in the animal body.

The laying on of fat is nature's way of storing up a reserve of energy and heat in the animal body, and animals at any stage, if supplied with sufficient food, will store fat in the body. There is, however, a greater tendency to store fat when the animal is past the early growing stage. The fat is stored in layers between the skin and the muscle, in the internal cavities of the body, and intermingled within the muscle fibres.

QUANTITY OF FOOD TO GIVE.

The growth, appetite, and condition of the pigs are the feeder's best guide in determining quantities of food to use, but for convenience in calculation the following may be taken as approximate requirements to produce rapid growth in pigs:—

Live Weight of Pigs.	Minimum Daily Allowance per Pig of Protein-rich Foods. OR		Daily Allowance per Pig of Grain or its Equivalent.
	Separated Milk or Buttermilk.	Meat Meal, etc.	
	Gallons.	Lb.	Lb.
20 lb.	½	¼	½
40 lb.	¾	½	1
60 lb.	¾	½	2
80 lb.	¾	½	3
100 lb.	¾	½	4
120 lb.	¾	½	5
140 lb.	¾	½	5½
160 lb.	¾	½	6
180 lb.	¾	½	6½
200 lb.	¾	½	7
Brood Sows (Dry)	¾	½	5–6
Brood Sows with litters over 2 weeks old	1½	1	10–12

When a minimum of three-quarter gallon of separated milk or butter milk daily per pig is available, there should be no necessity to use meat meal or similar protein-rich foods, excepting in the case of sows with litters, which require one and a-half gallons of milk.

When other foods are used to replace some or all of the grain allowance, it may be estimated approximately that 1 lb. of grain equals—

4 lb. Sweet potatoes.
4 lb. English potatoes.
5 lb. Arrowroot.
6 lb. Pumpkins.
8 lb. Mangolds.
5-10 lb. Green pasture or forage crops.
1 gal. Separated milk or butter milk (undiluted).
2 gal. Whey.

When pigs are receiving large quantities of protein-rich forage, such as lucerne, cowpeas, or field peas, the minimum requirement of protein-rich food such as milk or meat meal will be less than that shown in the table above. It should be remembered in using bulky foods to replace grain, that pigs have a limited capacity for such foods and better results are usually obtained by feeding at least some of the ration as grain. This applies more to young pigs than to brood sows.

Good pigs which are full fed should gain an average of 1 lb. live weight daily from 20 to 100 lb., and require an average of 3½ lb. of grain equivalent to make that 1 lb. gain. From 100 to 200 lb. the average daily live weight gain should be approximately 1½ lb. with a food requirement of approximately 4½ lb. grain equivalent for each 1 lb. gain.

The most important point to watch in pig feeding is the condition of the stock, for the pork and bacon trades require pigs in a finished, fleshy condition, but not too thin or too fat. It is known that pigs require variety in their rations, that at least a portion of their food should be concentrates, that they require both nitrogenous and carbonaceous foods, and that many other factors must be considered in the selection of pig foods.

PREPARATION OF FEEDING STUFFS.

Any benefit to be derived from the preparation of a food will depend on its character and condition, and on the animal. With most foods cooking is unnecessary for pigs, exceptions being offal and English potatoes, also milk products which are suspected of carrying the tubercle bacillus. In cold weather pigs prefer warm food and drink, and this should be attended to where practicable, as it will increase the palatability and help to maintain the body heat, portion of which would otherwise be absorbed in heating up the cold food in the digestive tract. While it is usually wise to force pigs to chew their foods, the small grains are more digestible when they are ground, crushed, or rolled, and even maize, which may be well chewed and digested at times, is often improved by grinding. On the other hand, pigs, if accustomed to the method of feeding and full fed, will make economical use of maize either on the cob or as whole shelled grain.

American experiments have shown a saving in food consumption resulting from the grinding of the small grains, such as wheat and sorghum, as compared with the same grains fed whole through a self-feeder, the saving being approximately 4 per cent. in the case of sorghum grain and 6 per cent. in the case of wheat.

When the small, hard grains cannot be crushed, ground, or rolled, they should be softened by soaking or boiling. Lucerne chaff or hay is sometimes steamed or soaked to increase its palatability for pigs, although after pigs become accustomed to these foods they make good use of them in a dry condition.

In the following notes the more common pig foods have been grouped as follows:—(1) Grains and mill offals; (2) protein-rich concentrates; (3) dairy by-products; (4) pasture and forage crops; (5) root crops; and (6) miscellaneous foods. The notes are intended to assist pig-raisers in determining the value of each food when used in combination with other foods.

Maize.

Maize is a carbonaceous (that is fat and energy producing) concentrate. It should always be fed to pigs in combination with protein-rich foods, such as milk, meatmeal, and lucerne. The improper use of maize in unbalanced rations has earned for it a reputation for producing a soft and fat carcase, but it has been amply demonstrated that, when used in complete and balanced rations, maize is one of the best pork producing foods, and its use can be continued with confidence, provided its shortcomings are understood.

The quantity of maize used in pig feeding is usually governed by its market value and the price of pork. Approximately 5 to 6 lb. of maize (or its equivalent, as it is not wise to feed maize alone), will produce 1 lb. of dressed pork in good young pigs, or each bushel of maize should return 10 lb. of pork. This knowledge enables the pig-raiser to calculate the value of maize as grain and as pork. When maize is worth 2s. 6d. per bushel as grain and dressed pork is worth 5d., per lb. each bushel of maize should be worth 5d. x 10=4s. 2d. as pork. In such a case it would pay the pig-raiser to feed all the available maize to good pigs, with just sufficient protein-rich foods to balance the ration. When the value of a bushel of maize is more than the value of 10 lb. of dressed pork, maize should be used as sparingly as possible, and some cheaper carbonaceous food used in its place where practicable.

Wheat.

In feeding value, wheat closely resembles maize, and it is nearly as palatable as maize. The quality of meat produced from wheat is very satisfactory. Wheat is less frequently used for stock feeding on account of its high average value for human food. Being a small, hard grain, wheat gives much better results if ground before being fed to pigs.

Barley.

Barley is another of the useful grains for the pig's diet; although slightly below the feeding value of maize and wheat, it is palatable and has a reputation for producing an excellent quality meat. Barley requires grinding before being fed to pigs.

Sorghum.

Grain sorghums are a much neglected pig food, ranking only a little behind maize in feeding value. The hardiness of this crop and its ability to produce grain when maize would fail, deserve the consideration of the pig farmer. Like the other small grains, sorghum grain should be ground before being fed to pigs to get the greatest feeding value, but as the grain can be fed on the heads or even from the standing crop, preparation by grinding will probably not be favoured by most farmers.

Pollard.

Pollard, which is a by-product from the milling of wheat, has its place on the pig farm, being very palatable, and usually available at a price to make it worth feeding to pigs.

Bran.

Another mill offal, is not such a good food for young pigs as pollard, its fibre content being higher, and its fat and carbohydrates being lower than those of pollard. Bran, however, is a laxative and, for this reason, it has its use for brood sows about farrowing time, and a bran mash is often given to pigs which are in ill-health, and need some food which will stimulate the bowels.

(2) PROTEIN-RICH CONCENTRATES.

Meat Meal.

Meat meal, which is sold under various trade names, is a by-product from meatworks and abattoirs of great value to the Australian pig farmer. It is a nitrogenous concentrate containing a very high percentage of digestible protein, and can be put to excellent use in balancing some of the common carbonaceous and bulky foods.

The Australian pig-raiser relies to a great extent upon separated milk for his supply of protein-rich food to balance the grains, &c. In consequence of our climatic conditions, however, the supply of milk products is very irregular, and in most years there is a period when the supply is too low to maintain a full supply of pigs. It is on occasions such as these, that meat meal can be put to good use as a substitute for milk products, thus keeping up a regular supply of pigs throughout the year.

Pigs can be satisfactorily grown on grain and meat meal without the use of milk when each pig receives ½ lb. of meat meal daily from weaning to baconer stage, and as much grain as it requires, which will be about 4 lb. for each 100 lb. live weight. Feeding the fixed amount of meat meal right through and just increasing the grain, automatically balances the ration as required.

When pigs have access to protein-rich pastures such as lucerne, the meat meal allowance may be reduced to ¼ lb. daily.

Plate 40.

Baconers grown on the self-feeder in which was placed a mixture containing 80 lb. maize meal, 10 lb. lucerne chaff, and 10 lb. meatmeal. The pigs were also given unlimited supplies of water to drink.

Meat meal may be fed either wet or dry. When fed wet, care should be taken so that there is no residue in the trough to putrify and become offensive in odour, and dangerous to the pig. It is a palatable food, and is relished by both young and old pigs.

Experiments have demonstrated that for balancing grains a supplementary mixture of two parts of meat meal, one part of linseed meal, and one part of lucerne chaff or meal by weight, is superior to meat meal alone.

Linseed Oil Meal.

Linseed Oil Meal is a protein-rich concentrate which can be used in a similar manner to meat meal. It contains less protein, but nevertheless it is a highly nutritious food and has a laxative action on the animal. When used as the only protein-rich supplement to grain, linseed meal does not give such good results as when it is used in combination with supplements such as separated milk, buttermilk, or meat meal. On account of its laxative action the addition of linseed meal to the ration of sows at farrowing time is a wise practice., The fairly high percentage of oil in this food makes it suitable for feeding to stock which are being prepared for show, as it gives them a glossy coat. Oily foods should be fed with care, as their excessive use tends to produce a soft, oily carcase.

Cotton Seed Meal.

This by-product of the cotton seed is a protein-rich concentrate. The use of cotton seed meal for pig-feeding has been limited because in some cases it has been found to produce poisoning when fed in a fairly large proportion, over a lengthy period; however, recent experiments, both here and in other countries, indicate that at least half the protein supplement of a ration may consist of cotton seed meal provided it is fed in conjunction with meat and bone meal.

(3) DAIRY BY-PRODUCTS.

Separated Milk

Although strictly speaking a protein-rich supplement for foods such as grains, separated milk is used in Australia very often as the basis of the ration, or as the whole ration, and to a large extent the supply of baconers and porkers is dependent on the supply of separated milk.

Separated milk contains no fibre, but about 90 per cent. of water. It is one of the most palatable and nutritious foods for pigs and is unsurpassed as a protein-rich supplement, being even a little superior to meat meal as a sole supplement to grain. Pigs of all ages relish separated milk, and being rich in minerals, it is particularly valuable for growing pigs and breeding stock. Being produced on most farms where pigs are raised, separated milk will be the cheapest protein-rich food for pigs.

If young pigs received a minimum of three-quarters of a gallon of separated milk per head daily from weaning to baconer stage, they will be receiving sufficient protein from the milk to balance all the grain they can eat. By feeding a constant amount of milk—three-quarters of a gallon daily—and increasing the grain as the pig grows, a fairly satisfactory balance is maintained in the ration. When just sufficient separated milk is used to balance the ration, the greatest value is being gained from the milk, and the feeding of greater quantities results in a loss of nitrogen from the protein of the milk (only the non-nitrogenous portion of the protein being used to make fat); but there are occasions when milk is available more cheaply than carbonaceous foods, and then it may be more economical to use larger quantities of separated milk.

Separated milk may be fed fresh or soured. When it is held in vats to sour and thicken, care should be taken not to allow it to putrify by holding in filthy containers, or by holding for too long a period. The ultimate gain from using soured milk is very small, if any, and if the milk is fed fresh after the froth has been removed, quite satisfactory results will be obtained. If large amounts of froth form in the pig trough, the pigs may suffer from a form of digestive disorder (wind), which may end disastrously.

Milk, besides being an excellent food for animals, is an excellent medium for the growth of bacteria, hence care should be taken to have the milk free of disease-producing organisms. Milk and its products which come from a cow suffering from tuberculosis, are a source of infection in pigs which receive this milk in a raw state. The milk from one tubercular cow may infect all the milk with which it is mixed, and so pigs drinking any of this milk in an uncooked state would be liable to infection.

Unless milk products come from cows that are certified as tubercle-free by a competent person, there may be a risk of tuberculosis being transmitted from a tuberculous cow to the pigs drinking the milk. It is well known that the tubercle germ is destroyed if held at a temperature of 155 deg. Fahr. for twenty minutes or at 180 deg. Fahr. for five minutes. Therefore, all doubtful milk should be heated to these temperatures as a safeguard against the infection of pigs. Heating milk to these temperatures is a fairly difficult problem on the average farm, but there are heating appliances manufactured for this purpose, and some farmers are using same with satisfaction.

Buttermilk.

Buttermilk, which is the residue from the cream during the process of butter-making, is almost identical in composition and feeding value to separated milk, but the buttermilk supplied by butter factories to pig raisers is usually more or less diluted with wash water from the churns, and, of course, its feeding value is reduced according to the amount of water added.

Butter milk, like separated milk, may carry the tubercle bacillus and be a source of danger to pigs unless the cream or the butter milk has been pasteurised. In butter factories pasteurising is done before the cream is put into the butter churns; provided this is carried out efficiently, that is, if the cream is held at a sufficiently high temperature for a sufficient length of time, there should be no risk of the butter milk causing infection in the pigs.

Whey.

Although whey is sometimes classed with separated milk and buttermilk as a stock food, it is really in a class of its own. During the process of cheese manufacture, of which whey is the by-product, a proportion of the protein in the form of casein is removed in the cheese, leaving the whey comparatively low in protein content.

Although whey cannot be called a protein-rich food, it has a place in cheese-making districts, and is a very valuable adjunct to rations of grain and forage crops, provided some protein-rich concentrate is used to bring up the protein content of the ration. Meat meal in small quantities is useful for this purpose. Feeding experiments have shown whey to be approximately half the value of separated milk. As in the case of other milk products, whey should be pasteurised before it is fed to pigs in order to minimise the risk of disease in the stock.

(4) PASTURE AND FORAGE CROPS.

Pigs running on good grazing land have less chance of suffering from deficiency of necessary nutrients than pigs which are confined in bare yards or pens, and hand fed. The rotational cultivating, cropping, and grazing of pig paddocks helps to maintain the fertility of the land, and provides one of the most practical means of controlling diseases and parasites, particularly kidney worms and round worms, which cause serious losses to the pig industry.

It is known that the greater part of the protein in a plant is present in the young growing portion, and as a large amount of protein is required by pigs, the pasture crops are best fed off when they are young and rich in protein; also at this stage, the crops are more succulent and contain less fibre, thus making them more valuable as pig food. While cattle make fair use of mature grazing crops, pigs make much better gains when fed on crops which have not reached maturity.

Plate 41.

Baconers being finished on a self-feeder under grazing conditions.

Perhaps the most outstanding single pasture grass for pigs in most Queensland pig-raising districts is Kikuyu grass. It is a vigorous grower, and when well established, stands heavy stocking. The nature of its growth enables Kikuyu to withstand a lot of the rooting and tearing about which pigs give a pasture. It is palatable and nutritious, and will thrive in a wide range of climatic conditions. To check the tendency of the pigs to root about and destroy the pasture, they should be removed to another paddock or their snouts should be cut or a ring inserted in the snout to prevent the pigs from rooting. While a good deal of damage may be done by pigs rooting up a lucerne or a paspalum paddock, in many cases the rooting does good; in fact, pigs have proved themselves good pasture renovators on matted paspalum paddocks which required breaking up.

Lucerne.

Lucerne, like all other legumes, is rich in protein and minerals, and, therefore, valuable for young pigs and breeding stock. It is palatable and readily eaten by pigs of all ages. Good quality lucerne hay that is not too stalky makes excellent roughage for pigs; although it must only be fed in limited quantities to young stock, breeding sows can be maintained in good condition on lucerne hay with a small amount of grain. Pigs do not always appreciate lucerne hay for a start, and they may be given a little chaff or lucerne meal, either dry or soaked, and mixed with other foods, until they become accustomed to it. The best way to feed lucerne hay is by placing it in a rack where the pigs can take it at will; a trough should be placed under the rack so that any leaf falling from the hay will be collected for the pigs. Farmers who have a supply of maize, lucerne, and separated milk have the material for supplying excellent rations to pigs, and in periods when the milk supply is low a good deal of the protein content can be made up by lucerne hay, which can be stored in a time of plenty.

There have been cases where a yellowish colour in pork—detrimental to the trade—has resulted from prolonged grazing on green lucerne, and, therefore, some caution is necessary in feeding green lucerne. However, it is not definitely known what amount of lucerne is required to cause this undesirable colouring, but it is known that pigs are often grazed on lucerne for months without any harmful result. To be on the safe side, the lucerne grazing should be used mainly for breeding stock and weaner pigs, and the other stock might be grazed only for short periods, or kept growing rapidly with the aid of other foods while on lucerne.

Cowpeas.

Cowpeas are a summer-growing legume, useful as a fodder crop for pigs when fed off with the young pods just filled out. In feeding value this crop resembles lucerne. Being an annual, it often fits in to the system of cropping pig paddocks.

Field Peas.

Field peas have a similar use to cowpeas, but they are a winter-growing annual crop. Field peas are a protein-rich crop which can be fed off before the seed pods are ripe, or it can be made into fair quality hay, which, together with the peas, makes an excellent fodder for brood sows. Sown with barley, oats, or wheat, and fed off in the young growing stages, field peas provide a nicely balanced pasture.

Peanuts.

Peanuts may be used as a forage crop for pigs, both the foliage and the nuts being eaten. Peanuts are highly nutritious, containing more than 40 per cent. of protein, and are rich in fat. Peanut meal with most of the oil extracted is available on the market, and is a similar food to linseed meal. A characteristic of peanut fat is that it is liquid (oil) at very low temperatures, and animal fat made up from peanut oil will not harden under ordinary chilling treatment, with the result that pork or bacon carcases from animals that have been fed on large quantities of peanuts are soft and oily and unsuitable for the trade.

Owing to their high protein and oil content, peanuts produce very rapid growth in pigs, and put a bright sheen on the pigs' coats. For that reason their use may be advocated for sows and litters up to weaning time, or for exhibition stock. For porkers and baconers, however, their use is dangerous, and for safety it should be discontinued a week or two after weaning.

Rape.

Rape is an annual crop which should be sown in March, April, or May, and in normal seasons should be ready for feeding off in two or three months after sowing. The cost of seeding rape is comparatively light, and the return from it is usually two or three grazings of succulent and nutritious fodder.

It happens occasionally that when young, tender-skinned pigs are grazed on rape which is wet with dew or rain, the rape has an irritating effect on the skin. This point should be watched in feeding rape. When the rape crop has been practically eaten down with only a few leaves showing on each plant, the stock should be removed until the crop recovers. In this way several grazings can be obtained in a season.

Cereal Crops for Forage.

For supplying green forage quickly in spring and summer, maize is very useful, being a quick grower, and it can be used at almost any stage of growth. If fine stems are required the maize may be grown thickly in rows. This is a wise practice if it is known that the crop will be wanted as green stuff for pigs because pigs make much better use of the finer-stemmed young maize than they do of the larger stems.

Oats, wheat, and barley either sown alone, or with rape or field peas, provide very useful pasturage during winter, and if carefully grazed the feeding period may be extended over several months. These crops should be grazed when they are about 10 inches high, for at this stage the plants are more succulent, more palatable, and contain more protein and less fibre than they do in the later stages of growth. The grazing should be so arranged that the crop is eaten down quickly and then rested until it is sufficiently re-established for grazing again.

Pigs should be moved from the crop paddock during wet weather if it is practicable, as their tramping and rooting may seriously effect the physical condition of heavy soils.

(5) ROOT CROPS.

Sweet Potatoes.

Sweet potatoes are a bulky carbonaceous food which may be used to some extent to replace grain in the ration, and add variety and succulence. About 4 lb. of sweet potatoes are equal to 1 lb. of grain. Where soil and climate suit the crop it is inexpensive to produce. The best means of harvesting in most cases is by turning the pigs in to the paddock. It is not only the tubers that are useful as food, but the vines also make good green fodder, although here a warning must be given to the effect that there are on record cases of prussic acid poisoning following the feeding of sweet potato vines to pigs. These cases, however, are so very few compared with the large number of pigs which are fed on this crop, that the risk of poisoning would appear to be very slight. The feeding of molasses is recommended to counteract any ill-effect from the vines. When pigs are fed on a fairly large amount of sweet potatoes they should be given liberal supplies of protein-rich foods, such as separated milk and meat meal.

Arrowroot (Canna edulis).

The arrowroot grown in the coastal districts of Queensland has a place in pig feeding in those districts, on account of its heavy yielding and hardy nature, and its ability to stand in the field for a long period before being harvested. Arrowroot is not a very nutritious crop, but it supplies a large bulk of succulent food which pigs relish.

Arrowroot is sometimes harvested and then boiled before being fed to pigs, but when one sees pigs harvesting the crop for themselves and doing very well, and wasting very little of the crop, one wonders if boiling is really a wise practice. Although most of the nutriment is in the bulbs of arrowroot, the pigs will eat the tops, which are usually very succulent. Arrowroot is a carbonaceous roughage and should be fed in combination with more concentrated and protein-rich foods. When feeding arrowroot—as with all crops—it is advisable to run a temporary fence across the block to confine the pigs to a small area until they have harvested it satisfactorily. In this way, the waste can be kept at a minimum.

Mangels.

The particular value of the mangel as a root crop for pig feeding lies in its ability to withstand a dry spring, provided it is well established in the autumn. The growing period is somewhat long, but if sown in the autumn, the mangel should be ready for feeding early in the following summer when other succulent fodders are usually scarce, and if it is not required when fully grown, the crop may be left in the ground for a few months without much deterioration resulting

Mangels are a bulky, watery food containing about 85 per cent. of water, but they are succulent and palatable and at the same time they supply a certain amount of nutriment. Like the sweet potato and arrowroot, mangels are a heavy yielding crop and worthy of a place in the cropping system of pig feeding.

Isolated cases have been reported of deaths in pigs following their eating mangels; there is very little information on this point, but most users make a practice of allowing mangels to wilt for a few days after harvesting and before feeding them to pigs; this may be a wise precaution.

Artichokes (Jerusalem Artichokes).

Although the sweet potato takes the place of artichokes in most cases on account of its heavier yielding capacity, artichokes are grown to some extent as a pig food. The tubers may be dug by hand or ploughed, or the pigs may be turned on to the crop to do their own harvesting. If hand dug, sufficient tubers may be left in the ground to give a crop in the following season, and if the pigs are doing the job they should be removed before all the tubers have been eaten out; the land should then be harrowed and left to produce the next season's crop; being a carbonaceous roughage, the artichoke should be fed together with protein-rich concentrates.

Potatoes.

The ordinary English potato is usually too high in price as a human food to be used for pigs, but there are times when unmarketable potatoes are available for pig food. They are a carbonaceous food of fair feeding value, and should be boiled before being fed to the pigs. About 4 lb. of potatoes are equal to 1 lb. of grain as pig food.

(6) MISCELLANEOUS FOODS.

Pumpkins.

In practically every pig-raising district of Queensland, pumpkins can be grown with comparatively little trouble, and their usual heavy yields, together with their excellent keeping qualities, make this crop one of the most important for the pig raiser. Pumpkins contain over

80 per cent. of water, and therefore are bulky, but they are palatable to pigs, and are best fed raw. The seeds of pumpkins contain fair amounts of oil and protein, and they also act as a mild vermifuge (i.e., they expel worms from the digestive tract of pigs), so the seeds should not be wasted, but they should be fed with caution, as digestive troubles sometimes occur when excessive amounts of seeds are fed without the flesh of the pumpkin. Cases of yellow colouration in the pork of pigs fed heavily on pumpkins have been reported, and in this respect care should be taken not to overdo pumpkin feeding with porkers and baconers.

Melons.

Melons are sometimes used as pig food, but contain about 95 per cent. of water, and are therefore not so nutritious as pumpkins, which contain about 83 per cent. of water.

Molasses.

Molasses has its uses as a pig food, but unfortunately its value is often over-estimated, with the result that various dietetic troubles occur in the stock. Molasses contains about 57 per cent. of digestible carbohydrates which are in the form of sugar, and its digestible protein is nil. It is therefore a fat, heat, and energy producing food, but not a flesh former.

Molasses has a laxative effect on stock, and for this reason it is valuable during dry seasons, when succulent green fodder is not available, and particularly for breeding sows which are sometimes inclined to become costive about farrowing time. Stock are very fond of molasses once they become accustomed to it, and this high degree of palatability makes it a useful addition to a ration containing less palatable foods. Molasses should only be given to pigs in small quantities at any time, for if it is fed carelessly severe diarrhœa may result. Up to 1 lb. of molasses daily for each 100 lb. live weight pig has been fed successfully in a well-balanced ration, containing grain and protein-rich foods, the molasses replacing some of the grain.

When grains or other carbonaceous foods are not available cheaply, molasses may be used with success, provided it is not overdone. Molasses should always be fed in combination with protein-rich foods such as milk or meat meal, as it supplies no protein to the animal.

Garbage.

Waste foods from private house, boarding-house, hotel, shop, cafe, hospital, and home can be put to good use through the pig, which will change waste into edible pork with a fair degree of efficiency, and provided the business is properly founded and well conducted, garbage feeding of pigs can be a profitable undertaking.

It is a general practice to boil garbage for an hour before feeding it to pigs. This is a safeguard against disease to some extent, and at the same time the cooking increases the palatability of most garbage. During the boiling, any excessive amounts of fat can be removed by skimming. When too much fat is given to the pigs they tend to become soft in the carcase, and so are unsuitable for the bacon curer or the pork butcher.

A common error in garbage feeding is to add too much water, thus making the food too bulky. The addition of grain and green fodder to garbage improves the ration considerably. Weaners do not thrive on ordinary garbage and they should be given other more nourishing foods until they are about 60 lb. weight. Then the change to garbage should be gradual. Garbage containing fish should not be fed to pigs being grown for pork or bacon as the fish flavour is very strong and taints the carcase.

There is always an element of risk in garbage feeding, for one never knows when some poison or injurious substance may find its way into the garbage, and result in the loss of a number of pigs. Swine fever may be carried through pigs eating the flesh of pigs suffering from swine fever. Salt poisoning occurs occasionally through brine from pickled meat being placed in the garbage for pigs. Pigs appreciate a little salt, up to ¼ oz. daily for 100-lb pig, but large amounts may cause death.

BREEDING.

THE COMMERCIAL ASPECT.

When discussing breeds of pigs it should be understood that a breed is a group of animals of the same species whose heredity is segregated from other groups, and whose individuals derive their inheritance from a similar source. Pigs of one breed are usually selected and bred to a more or less common standard, but that standard varies in different environments and is differently interpreted by individual breeders, so that we see pigs of the same breed extremely variable in many characteristics, such as conformation and productiveness and usually only common in colour.

In view of the variation within breeds, it is not prudent to consider a breed of pigs as a standardised group of individuals which are identical in conformation and other characteristics.

Breeders of pigs adopt a "standard of excellence" for each breed and make this their basis of selection for mating, and show judges use it in making their awards. The "standard of excellence" is based on conformation, apparent quality, and apparent potential productiveness. The ideal conformation is deemed to be that which is most likely to give productiveness in the pigs and quality in the carcase.

These "standards of excellence" have no marked degree of definition, and their interpretation varies with individual breeders and judges.

The "standards of excellence" also include colour specifications for the skin and hair, these features being considered as some indication of the purity of breeding.

The pig is a utility animal, and the pig-breeding industry depends upon the ability of the pigs to convert certain food products into pork, for which there is a demand as food for humans.

The value of any breed or family of pigs depends upon its ability to breed freely and produce fast-growing pigs, which make economical use of the available food, and whose carcases provide meat of the kind which consumers desire.

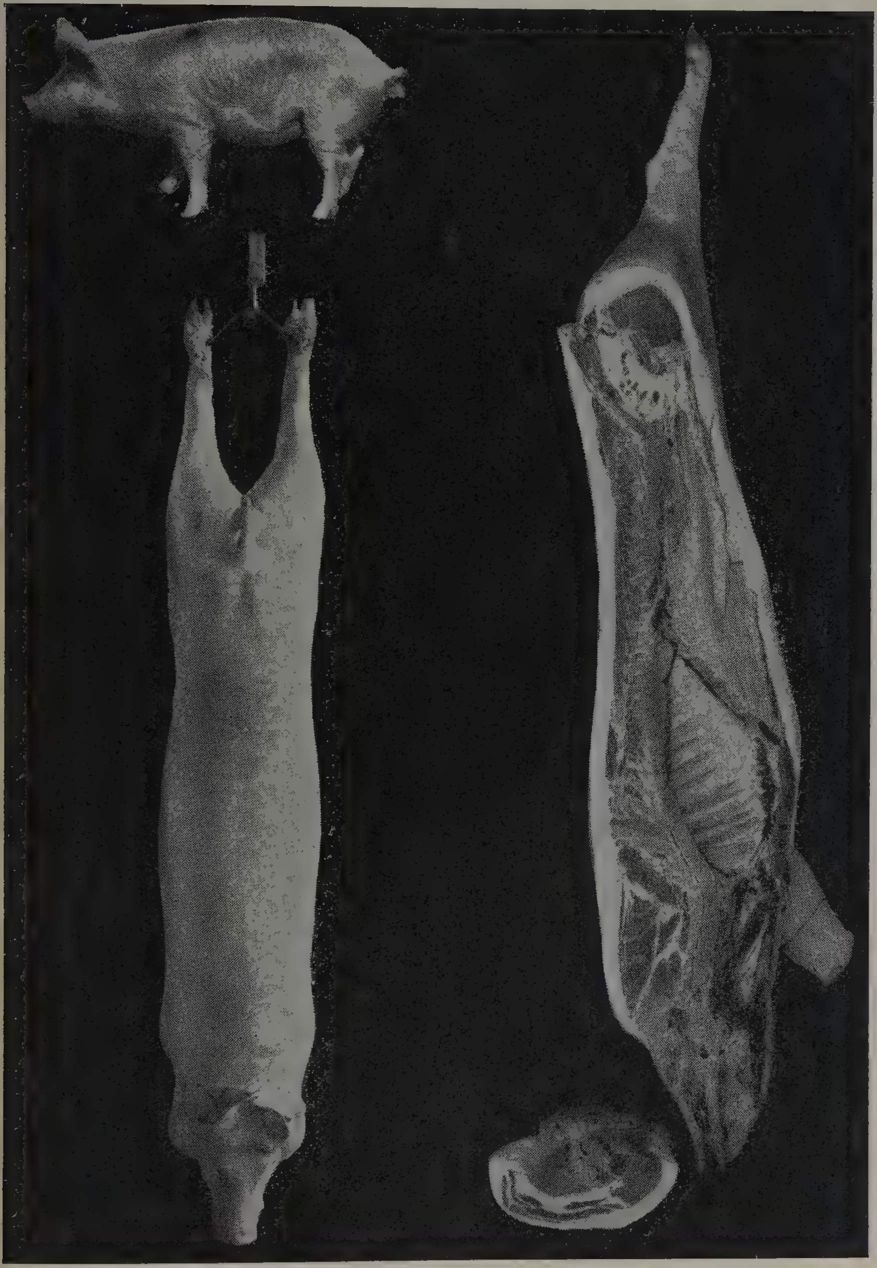


Plate 42.
The "finished" pig, its carcase and its cuts.

Before any pig or family of pigs can be valued for comparative purposes it is necessary to have some basis of valuation. The prolificacy of breeding stock can be measured and recorded, "age for weight" in their progeny can be measured by weighing, similarly food consumption per unit of pork produced can be measured; carcase quality, however, is more difficult to value because several features of the carcase must be considered, and further, the term carcase quality is vague and varies according to the markets which are being supplied.

The consumer plays such an important part in the pig industry that it is necessary to consider the requirements of the consumer before embarking on any pig-breeding programme.

Although the local, interstate, and overseas trades with which the Queensland pig industry is concerned require carcases of weight ranges varying from 60 lb. to 160 lb., there is a particular kind of carcase required by those markets, that desirable carcase being balanced in the proportion of its various parts, and having a large proportion of lean meat, with a comparatively small and well-distributed amount of fat.

Carcase quality has until recently been difficult to define, but with the recently adopted system of carcase appraisal which is now in use in Australia and England, the industry has a measure of carcase quality which sets a standard and allows comparisons to be made.

All the important characteristics of pigs can, therefore, be fairly accurately measured and on these standards the breeders of pigs should base their selection aiming at a correct balance between productiveness, economy and rate of growth, and carcase quality. It is also desirable that judging at pig shows should be conducted on the basis of utility as well as on those characteristics such as colour, shape of the head, and carriage of the ears, which distinguish one breed from another. Judging pigs on outward appearance alone goes so far as to enable breeders to compare the general appearance of their pigs with that of others, and to get the opinion of the judges on their stock, but unless such information gained at shows is used in conjunction with records of performance, it can do little more than keep the standard of a breed at its present level, and further improvement will be slow.

Improvement in livestock results from improved environment and the selection of those animals for breeding purposes which have the most desirable characteristics in their inheritance; if care is not continuously exercised in the selection of pigs they will quickly revert to inferior standards.

Carcase appraisal has been used sufficiently to provide valuable data on carcase quality of Australian pigs, and it is evident from those data that most pigs are deficient in body length, and most pig producers market their pigs in an excessively fat condition.

The illustrations in Plate 42 show a pig which gained the highest marks in a Queensland carcase competition; they are valuable in indicating the apparent condition of the live pig, whose carcase measured close to the standard.

TYPE CLASSIFICATION OF PIGS.

Under normal or average conditions pigs pass through three more or less distinct stages in their growth to maturity. In the early stage the bony framework is developing very rapidly, then at a later stage the muscular system is developed on and around the skeleton; then as the pig approaches maturity it lays on fat very rapidly, both on and between the muscles. To provide carcases which are well proportioned and which carry a large proportion of lean meat with a light covering of fat, it is necessary that pigs should be slaughtered when they are just commencing on that rapid fattening stage, and before they become "thick."

All pigs do not reach this stage of maturity at the same weights; those which reach that desired stage of finish at light weights, say from 60 to 90 lb. carcase weights are called porker type, and those which reach it at heavier weights are known as baconer type. Among the baconers there are those which are finished at weights from 100 to 120 lb., and those which finish at weights from 130 to 160 lb., and are most suitable for the English Wiltshire bacon trade.

This classification of type can be carried to breeding stock which produce progeny of porker type, light baconer type or heavy baconer type.

Type classification can only be applied where pigs are kept under average conditions; intensive feeding and housing tend to produce earlier fattening, while limited feeding and grazing delay fattening, but grazing does not necessarily cause slow growth; pigs may grow and increase rapidly in weight even though they are not fattening. To produce an ideal light porker, light baconer or heavy baconer from the same type of pigs, the environment must be altered to suit.

Type in mature pigs is indicated mainly by their size of frame. (See Plate 43.)

Porker or baconer type classification is usually taken into consideration in judging pigs, but whether a particular breed should be porker type or baconer type is a matter of conjecture among breeders and judges; it is therefore to be expected that a variation in type will be seen within any one breed. The weight of opinion in Australia at present is in favour of directing the Berkshire and Middle White breeds to the porker type and the Large White, Tamworth, and Wessex Saddleback breeds to baconer type, although the majority of Tamworth and Wessex breeders are keeping their breeds closer to the lighter bacon type.

From the foregoing statements it is evident that pig breeders should fix their breed standards on porker, light baconer, or heavy baconer type classification, and give consideration to this when selecting or judging stock. It should also be realised that under average conditions there are pigs for pork and pigs for bacon. The commonest error in pig breeding in Queensland is the use of porker type pigs for the production of bacon weight carcases, which under normal conditions of feeding are much too fat and short for bacon trade requirements.

The figures in Plate 43 give an indication of the development towards maturity of the progeny of pigs of three distinct types. The degrees of finish of each type at weaner age, porker weight, light baconer weight and heavy baconer weight are shown under the figure of the mature pig which produces such a type.

Size in breeding stock is reflected as rapid growth in their pigs, and it is therefore the most important feature of any pig. Size within the breed or type is quickly lost in Queensland, due probably to mating pigs when they are too immature, and possibly to climatic and feeding conditions.

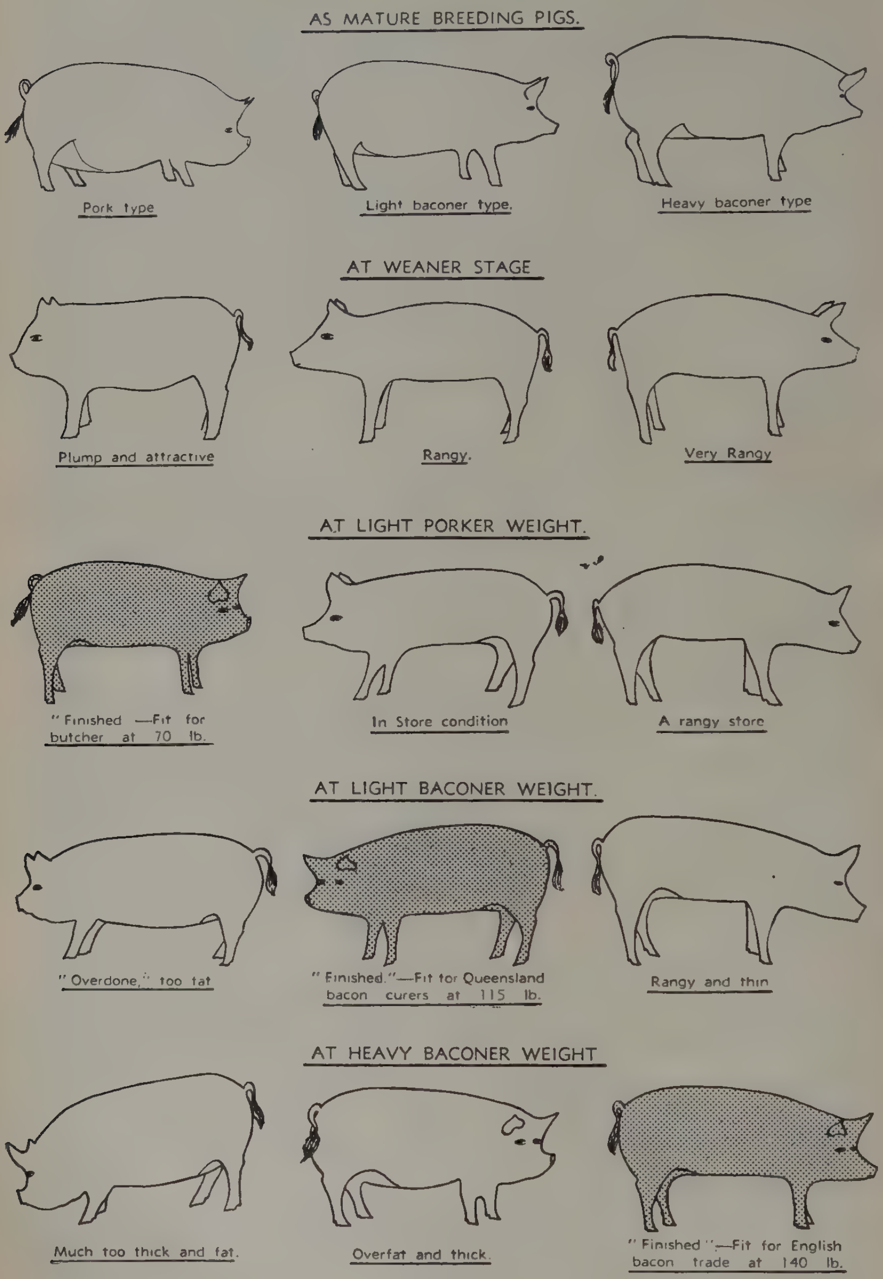

AS MATURE BREEDING PIGS.
Pork type
Light baconer type.
Heavy baconer type
AT WEANER STAGE
Plump and attractive
Rangy.
Very Rangy
AT LIGHT PORKER WEIGHT.
"Finished"—Fit for butcher at 70 lb.
In Store condition
A rangy store
AT LIGHT BACONER WEIGHT.
"Overdone," too fat
"Finished."—Fit for Queensland bacon curers at 115 lb.
Rangy and thin
AT HEAVY BACONER WEIGHT
Much too thick and fat.
Overfat and thick.
"Finished"—Fit for English bacon trade at 140 lb.

Plate 43.

An illustration of the different degrees of maturity of progeny of porker, light-baconer, and heavy-baconer types at various stages of their growth. The heavily-shaded pigs have reached the stage of maturity at which they should be marketed.

THE BREEDS OF PIGS.

There are many breeds of pigs in the world, at least twelve of which have been introduced to Australia, but at present there are five breeds prominent in Queensland; these are Berkshire, Large White, Middle White, Tamworth, and Wessex Saddleback.

As a prelude to the description of the breeds, it can be stated that several features are desirable in all breeds; these will be dealt with first, and the description of individual breed characteristics with illustrations will follow.

In breeding stock, size within the breed type is the first essential; pigs should be well grown for their age. Character as indicated by the gait, carriage of the head, and general appearance is another essential in stud stock. Docility, with feminity in the female and masculinity in the male are features to be desired. The good pig has strong, straight legs set well on the outside of the body; the feet should be fairly compact. The fore end of the pig should be comparatively light, the middle long, and the hams full and well fleshed. Both boars and sows should have at least twelve well-placed teats. As the teat characteristics of a boar has a relationship to the teats of his female progeny it is necessary to watch this feature in the selection of the sire.

Symmetry, full development, and freedom from abnormalities are further essentials in stud pigs of all breeds.

The Berkshire.

England is the home of Berkshire pigs and from English herds pigs have been sent to most countries to establish herds. In Australia the Berkshire is the most prominent among the several breeds of pigs, being found to adapt itself to a wide range of conditions.

The Berkshire pig is mostly used in Australia for the production of porkers, or, when crossed with the extreme baconer breeds, for the production of light weight baconers.

Within the Berkshire breed there is considerable variation of type, for example, the rangy type seen in the Canadian strains, which has been evolved for the production of baconers. The type of Berkshire favoured by most breeders and judges in Australia is that illustrated in Plate 44. This pig has all the characteristics of the breed, is a porker type, and yet well developed.

Early Berkshire breeders fixed as their standard colour for the breed, black with white points—i.e., white on the four feet, the face, and the brush of the tail—and this is the standard colour as set down by the breed societies for the present-day Berkshire.

It is well known to those who have had the handling of Berkshire pigs that the standard of colour and markings as set down for the breed is rarely attained, and it is a very difficult matter for breeders to get the exact marking which they require in the breed. Even when well-marked pigs are mated, the progeny usually show some variation from the ideal marking seen in the parent stock; but it must be understood that there is more chance of getting well-marked pigs by mating boars and sows which are well marked, than by mating those which are badly marked. While the breeder of Berkshires wishes to pay attention to the breeding of well-marked animals, he must not neglect other characteristics, such as conformation, quality, and productiveness, which, after all, are the most important features of any breed of pig. It should be borne in mind that pigs are used primarily to produce pork, and it is often necessary for both the stud breeder and the show judge to overlook slight faults in the markings of the animals. So far as it concerns the farmer who is using Berkshire pigs for the production of pork and bacon, the colour markings count little, and the more important characteristics are productiveness, type, and quality.

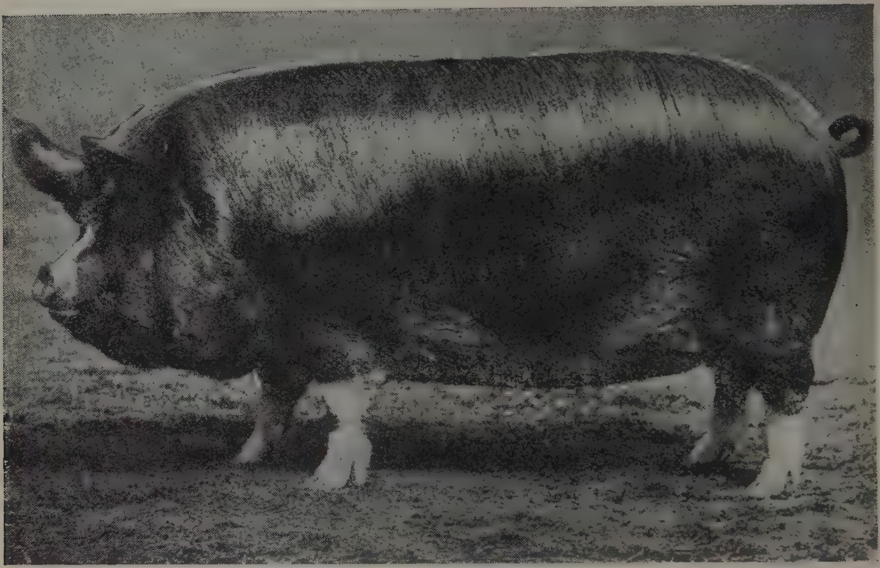


Plate 44.
A Typical Berkshire.

The Large White.

The Large White is one of the largest breeds, and is used extensively for the production of baconers in England, where the breed was evolved, and in most bacon producing countries to which it has been exported.

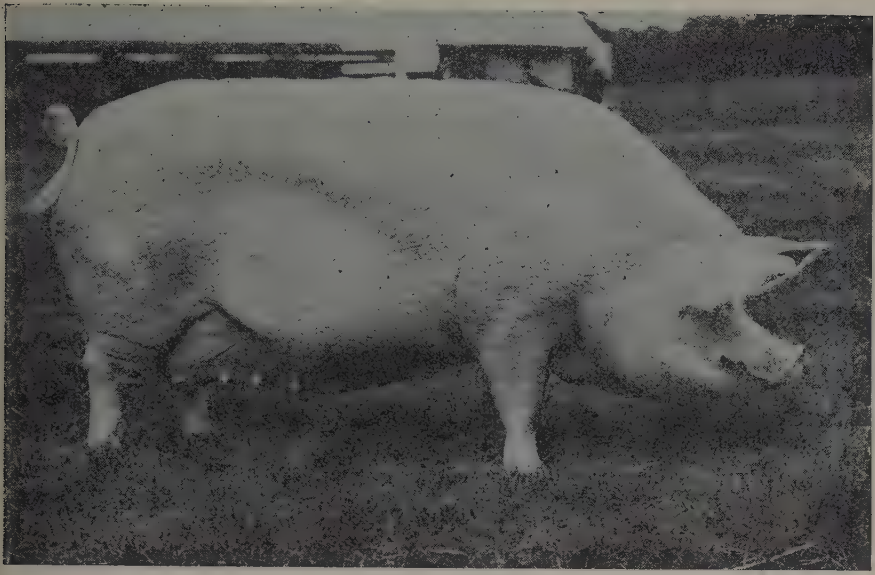
The Large White has white hair on a pinkish skin, although blemishes in the form of blue or black spots on the skin are frequent, and whilst considered undesirable are not a disqualification, as they do not indicate impurity of breeding.

The Middle White.

The Middle White is more compact in stature than the Large White, in fact, it is very similar in conformation to the Berkshire, and as such, the Middle White is a porker-type breed.

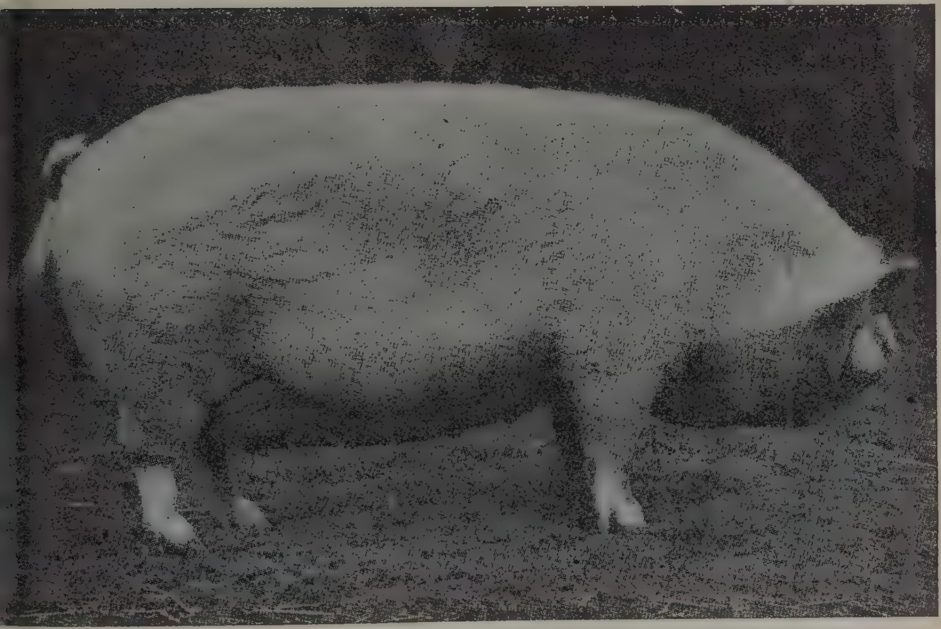
This breed was evolved in England, and is used there and in Australia fairly extensively for the production of light porkers.

The colour of the Middle White is white hair on a pinkish skin; blue or black spots do sometimes occur on the skin, and they are undesirable.



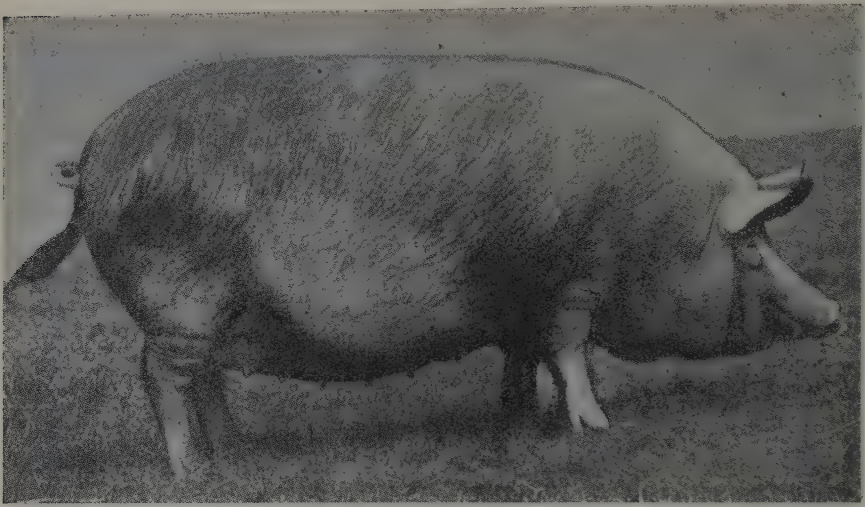
[*Photo.: Farmer and Stock Breeder.*

Plate 45.
A Typical Large White.



[*Photo.: Hosegood. Pig Breeders' Annual.*

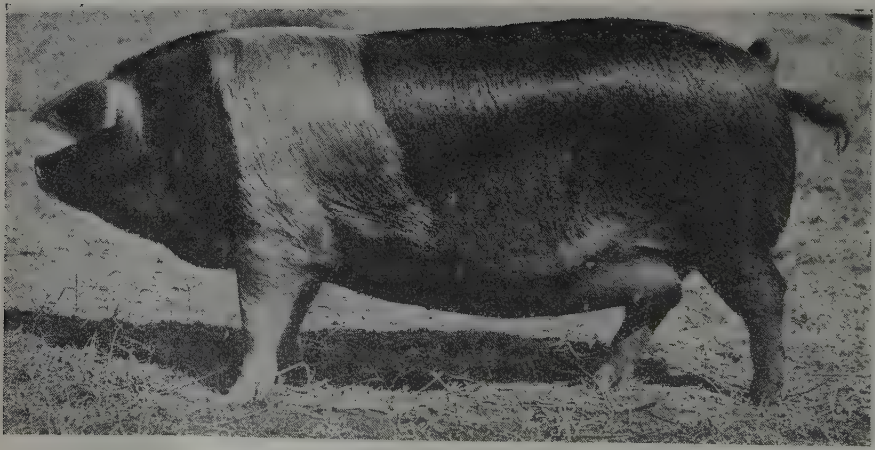
Plate 46.
A Typical Middle White.



[Photo.:McCann. National Pig Breeders' Association Herd Book.

Plate 47.

A Typical Tamworth.



[Sport and General Photo.]

Plate 48.

A Typical Wessex Saddleback.

The Tamworths.

The Tamworth is another English breed and is of baconer type, although there is a tendency for breeders to select to a lighter bacon type which is more compact than the older Tamworth and the present Large White.

The colour standard of the Tamworth is golden red, and although there are usually some spots or patches of black skin, and some black hairs are prevalent, the black is undesirable and breeders endeavour to breed it out; but as with other breeds colour is not so important as quality and conformation.

The Wessex Saddleback.

The Wessex Saddleback, as the name denotes, is an English breed, which carries a white saddle over the shoulders and down the fore legs; the remainder of the colour is black.

The Wessex is a medium to large type of pig. The ears are carried forward over the face and are fairly long.

GENERAL MANAGEMENT OF THE HERD.

Young pigs should be well grown before mating; breeding from animals too early in their growth will, in a few generations, ruin their size, which is the most important characteristic of any pig. If the farmer wants to have large and fast-growing pigs, he must breed them that way as well as feed them that way. Usually pigs are well enough grown for mating at nine or ten months of age, or over 250 lb. live weight, and boars and sows must be kept apart until they reach that stage. If this is not done they will mate, perhaps, at five months of age.

MATING.

For best results the boar should be kept in a separate enclosure from the sows, and when a sow is hogging (which is usually well indicated to the observant pig-raiser) she should be placed with the boar, and allowed one service, then removed, and if it is practicable, she should be put in a yard on her own so that she will not be knocked about by other pigs. Then it may be advisable to allow the sow to return to the boar for a second service on the following day. If the sow does not hold to the service she will be in season again in twenty-one days. The period of heat (œstral period) usually lasts for two days, although it varies in different sows from one to three days.

After the service has taken place, it should be recorded in a "breeding" record, together with date, then, three weeks later, the sow should be watched to see if she returns to service. From this record the expected date of farrowing can be determined by reference to a gestation chart.

GESTATION CHART FOR BREEDING SOWS.

Jan.	Date of Farrowing.	Feb.	Date of Farrowing.	March.	Date of Farrowing.	April.	Date of Farrowing.	May.	Date of Farrowing.	June.	Date of Farrowing.	July.	Date of Farrowing.	Aug.	Date of Farrowing.	Sept.	Date of Farrowing.	Oct.	Date of Farrowing.	Nov.	Date of Farrowing.	Dec.	Date of Farrowing.
1	22 April	**1**	23 May	**1**	20 June	**1**	21 July	**1**	20 Aug.	**1**	20 Sept.	**1**	20 Oct.	**1**	20 Nov.	**1**	21 Dec.	**1**	20 Jan.	**1**	20 Feb.	**1**	22 Mar.
2	23 ,,	**2**	24 ,,	**2**	21 ,,	**2**	22 ,,	**2**	21 ,,	**2**	21 ,,	**2**	21 ,,	**2**	21 ,,	**2**	22 ,,	**2**	21 ,,	**2**	21 ,,	**2**	23 ,,
3	24 ,,	**3**	25 ,,	**3**	22 ,,	**3**	23 ,,	**3**	22 ,,	**3**	22 ,,	**3**	22 ,,	**3**	22 ,,	**3**	23 ,,	**3**	22 ,,	**3**	22 ,,	**3**	24 ,,
4	25 ,,	**4**	26 ,,	**4**	23 ,,	**4**	24 ,,	**4**	23 ,,	**4**	23 ,,	**4**	23 ,,	**4**	23 ,,	**4**	24 ,,	**4**	23 ,,	**4**	23 ,,	**4**	25 ,,
5	26 ,,	**5**	27 ,,	**5**	24 ,,	**5**	25 ,,	**5**	24 ,,	**5**	24 ,,	**5**	24 ,,	**5**	24 ,,	**5**	25 ,,	**5**	24 ,,	**5**	24 ,,	**5**	26 ,,
6	27 ,,	**6**	28 ,,	**6**	25 ,,	**6**	26 ,,	**6**	25 ,,	**6**	25 ,,	**6**	25 ,,	**6**	25 ,,	**6**	26 ,,	**6**	25 ,,	**6**	25 ,,	**6**	27 ,,
7	28 ,,	**7**	29 ,,	**7**	26 ,,	**7**	27 ,,	**7**	26 ,,	**7**	26 ,,	**7**	26 ,,	**7**	26 ,,	**7**	27 ,,	**7**	26 ,,	**7**	26 ,,	**7**	28 ,,
8	29 ,,	**8**	30 ,,	**8**	27 ,,	**8**	28 ,,	**8**	27 ,,	**8**	27 ,,	**8**	27 ,,	**8**	27 ,,	**8**	28 ,,	**8**	27 ,,	**8**	27 ,,	**8**	29 ,,
9	30 ,,	**9**	31 ,,	**9**	28 ,,	**9**	29 ,,	**9**	28 ,,	**9**	28 ,,	**9**	28 ,,	**9**	28 ,,	**9**	29 ,,	**9**	28 ,,	**9**	28 ,,	**9**	30 ,,
10	1 May	**10**	1 June	**10**	29 ,,	**10**	30 ,,	**10**	29 ,,	**10**	29 ,,	**10**	29 ,,	**10**	29 ,,	**10**	30 ,,	**10**	29 ,,	**10**	1 Mar.	**10**	31 ,,
11	2 ,,	**11**	2 ,,	**11**	30 ,,	**11**	31 ,,	**11**	30 ,,	**11**	30 ,,	**11**	30 ,,	**11**	30 ,,	**11**	31 ,,	**11**	30 ,,	**11**	2 ,,	**11**	1 April
12	3 ,,	**12**	3 ,,	**12**	1 July	**12**	1 Aug.	**12**	31 ,,	**12**	1 Oct.	**12**	31 ,,	**12**	1 Dec.	**12**	1 Jan.	**12**	31 ,,	**12**	3 ,,	**12**	2 ,,
13	4 ,,	**13**	4 ,,	**13**	2 ,,	**13**	2 ,,	**13**	1 Sept.	**13**	2 ,,	**13**	1 Nov.	**13**	2 ,,	**13**	2 ,,	**13**	1 Feb.	**13**	4 ,,	**13**	3 ,,
14	5 ,,	**14**	5 ,,	**14**	3 ,,	**14**	3 ,,	**14**	2 ,,	**14**	3 ,,	**14**	2 ,,	**14**	3 ,,	**14**	3 ,,	**14**	2 ,,	**14**	5 ,,	**14**	4 ,,
15	6 ,,	**15**	6 ,,	**15**	4 ,,	**15**	4 ,,	**15**	3 ,,	**15**	4 ,,	**15**	3 ,,	**15**	4 ,,	**15**	4 ,,	**15**	3 ,,	**15**	6 ,,	**15**	5 ,,
16	7 ,,	**16**	7 ,,	**16**	5 ,,	**16**	5 ,,	**16**	4 ,,	**16**	5 ,,	**16**	4 ,,	**16**	5 ,,	**16**	5 ,,	**16**	4 ,,	**16**	7 ,,	**16**	6 ,,
17	8 ,,	**17**	8 ,,	**17**	6 ,,	**17**	6 ,,	**17**	5 ,,	**17**	6 ,,	**17**	5 ,,	**17**	6 ,,	**17**	6 ,,	**17**	5 ,,	**17**	8 ,,	**17**	7 ,,
18	9 ,,	**18**	9 ,,	**18**	7 ,,	**18**	7 ,,	**18**	6 ,,	**18**	7 ,,	**18**	6 ,,	**18**	7 ,,	**18**	7 ,,	**18**	6 ,,	**18**	9 ,,	**18**	8 ,,
19	10 ,,	**19**	10 ,,	**19**	8 ,,	**19**	8 ,,	**19**	7 ,,	**19**	8 ,,	**19**	7 ,,	**19**	8 ,,	**19**	8 ,,	**19**	7 ,,	**19**	10 ,,	**19**	9 ,,
20	11 ,,	**20**	11 ,,	**20**	9 ,,	**20**	9 ,,	**20**	8 ,,	**20**	9 ,,	**20**	8 ,,	**20**	9 ,,	**20**	9 ,,	**20**	8 ,,	**20**	11 ,,	**20**	10 ,,
21	12 ,,	**21**	12 ,,	**21**	10 ,,	**21**	10 ,,	**21**	9 ,,	**21**	10 ,,	**21**	9 ,,	**21**	10 ,,	**21**	10 ,,	**21**	9 ,,	**21**	12 ,,	**21**	11 ,,
22	13 ,,	**22**	13 ,,	**22**	11 ,,	**22**	11 ,,	**22**	10 ,,	**22**	11 ,,	**22**	10 ,,	**22**	11 ,,	**22**	11 ,,	**22**	10 ,,	**22**	13 ,,	**22**	12 ,,
23	14 ,,	**23**	14 ,,	**23**	12 ,,	**23**	12 ,,	**23**	11 ,,	**23**	12 ,,	**23**	11 ,,	**23**	12 ,,	**23**	12 ,,	**23**	11 ,,	**23**	14 ,,	**23**	13 ,,
24	15 ,,	**24**	15 ,,	**24**	13 ,,	**24**	13 ,,	**24**	12 ,,	**24**	13 ,,	**24**	12 ,,	**24**	13 ,,	**24**	13 ,,	**24**	12 ,,	**24**	15 ,,	**24**	14 ,,
25	16 ,,	**25**	16 ,,	**25**	14 ,,	**25**	14 ,,	**25**	13 ,,	**25**	14 ,,	**25**	13 ,,	**25**	14 ,,	**25**	14 ,,	**25**	13 ,,	**25**	16 ,,	**25**	15 ,,
26	17 ,,	**26**	17 ,,	**26**	15 ,,	**26**	15 ,,	**26**	14 ,,	**26**	15 ,,	**26**	14 ,,	**26**	15 ,,	**26**	15 ,,	**26**	14 ,,	**26**	17 ,,	**26**	16 ,,
27	18 ,,	**27**	18 ,,	**27**	16 ,,	**27**	16 ,,	**27**	15 ,,	**27**	16 ,,	**27**	15 ,,	**27**	16 ,,	**27**	16 ,,	**27**	15 ,,	**27**	18 ,,	**27**	17 ,,
28	19 ,,	**28**	19 ,,	**28**	17 ,,	**28**	17 ,,	**28**	16 ,,	**28**	17 ,,	**28**	16 ,,	**28**	17 ,,	**28**	17 ,,	**28**	16 ,,	**28**	19 ,,	**28**	18 ,,
29	20 ,,	—	—	**29**	18 ,,	**29**	18 ,,	**29**	17 ,,	**29**	18 ,,	**29**	17 ,,	**29**	18 ,,	**29**	18 ,,	**29**	17 ,,	**29**	20 ,,	**29**	19 ,,
30	21 ,,	—	—	**30**	19 ,,	**30**	19 ,,	**30**	18 ,,	**30**	19 ,,	**30**	18 ,,	**30**	19 ,,	**30**	19 ,,	**30**	18 ,,	**30**	21 ,,	**30**	20 ,,
31	22 ,,	—	—	**31**	20 ,,	—	—	**31**	19 ,,	—	—	**31**	19 ,,	**31**	20 ,,	—	—	**31**	19 ,,	—	—	**31**	21 ,,

NOTE.—Black figures in the above table indicate date of service.

This chart presents in an instructive form figures relating to the gestation period of brood sows. For example, a sow mated to the boar on 1st January is due to farrow on 22nd April; a sow mated on 1st July is due on 20th October. The normal period of gestation, *i.e.*, the period from the time of conception to the birth of the young pigs, is 112 days, this period is sometimes remembered as roughly three months, three weeks, and three days, or 16 weeks. With very young sows the period is sometimes of shorter duration, and instances are on record where young sows have farrowed at from 100 to 108 days after becoming pregnant; on the other hand, old sows in abnormal condition have been known to carry their young for more than 120 days.

SOW'S BREEDING RECORD.

Breed : Name : Registered Number : Date of Birth : Earmark :

Date of Service.	Date of Farrowing.	Sire of Litter.	Number Born.		Number Weaned.		Tattoo or Earmark Given and Date Weaned.	Died after Weaning.		Sold or Killed for Meat.		Stud Sales.		Gross Returns.	Remarks.
			Male.	Female.	Male.	Female.		Male.	Female.	Male.	Female.	Male.	Female.		

Such a record may be used in card or book form.

Plate 49.
The number and weight of the pigs reared in each litter reflect the efficiency of the business.

CARE OF IN-PIG SOWS.

At service time, the sow is usually in medium condition. She should then be fed so as to have her gradually improving up to farrowing time, when she should be in her best form, but not excessively fat.

Towards the end of the gestation period it is very advisable to clean all the lice off the sow so that the young pigs will not be infested soon after they are born. To destroy the lice, the sow should receive three applications, one week apart, of either a weak solution of a coal-tar disinfectant, or some cheap grade of oil, such as crude petroleum oil. These should be either sprayed or rubbed on to every part of the pig's skin.

FARROWING TIME.

Before the sow is expected to farrow she should be taken from the herd and placed in a run on her own where she can go into a clean and comfortable shed. Some short, dry grass or straw should be put into the shed for bedding, and this should be changed when necessary to keep the bed clean and dry. Care is essential at this period to prevent the sow from becoming constipated, which would cause trouble in parturition and may be followed by fever. Just prior to farrowing the sow should be fed very lightly, and the food should be of a laxative nature—green foods and a little molasses are very useful.

THE SUCKLING PERIOD.

It is important that the sow should not be fed for about twenty-four hours after farrowing, unless it is to give her a small drink. The first feed should be a light one, with half a cupful of castor oil added to help to put the sow in good form. For the first two weeks after farrowing the sow should be fed lightly.

Iron as a Preventive of Anæmia.

A deficiency of iron in the sow's milk has been proved to be the cause of anæmia in young suckers, the anæmia being indicated by a paleness in the pigs, a wrinkling of the skin, and diarrhœa. The trouble occurs from the time the pigs are born until they commence to eat solid foods. Where sows and litters are run on pasture the anæmia does not occur, as the pigs receive iron from nosing in the ground, but in intensive pens where pigs have no access to soil, trouble may be anticipated unless precautions are taken. Simple means of prevention, when litters are penned, consist of giving either a supply of mineral mixture containing sulphate of iron, or a quantity of fresh soil or turf in the pen where the suckers have access to it.

Some pig raisers get good results by mixing 2 lb. of sulphate of iron with 100 lb. of fresh soil and placing about a pound of this mixture on the floor of the intensive pen each day after the litter is born.

Individual care is most necessary for sows and litters until the youngsters are about three weeks old, and after that time several sows with litters of approximately the same age may be run together with good results; however, no other pigs should be run with these. When the pigs are three or four weeks old they may be provided with a self-feeder containing grain or meals; the sows may also be given access to the self-feeder during this latter half of the lactation period, one feeder being sufficient for several sows and litters. When a feeder containing dry foods is provided, there should also be an accessible water supply, even if the pigs are given milk in addition. The young pigs do very well on this system of feeding, and when it is desired to wean them at eight weeks old the self-feeder should be enclosed with hurdles, which enable the young pigs to enter, but exclude the sows. The sow's food supply is so reduced that her milk flow ceases, and at the same time the young pigs take a larger amount of food from the trough, and thus weaning is achieved satisfactorily

The male pigs not required for breeding should be castrated when about six weeks old, as at this stage the operation is easily performed and it has little ill-effect on the pigs, which quickly recover if the operation is done properly, and they are treated with some disinfectant, then put into a clean grass run or on a clean floor. Ear tattooing and ear-marking can be done at the same time as castration.

WEANING.

The pigs should be weaned from the sow when they are eight to nine weeks old. After being separated a day, the sow should be put with the litter for an hour or so for the pigs to empty her udders. This should be repeated on the following day, by which time most sows will be dry, although, in some cases, it is necessary to put the sow back to the suckers for several days before she dries off. At this time the sow's feed should be very light, so that she will not make much milk. The sow will usually come on hogging when the litter is about nine weeks old, and if she is not too low in condition, she can be mated to the boar then, but in cases where the sow's condition is very low, it is preferable to withhold the service for at least three weeks.

The Growing Period.

From weaning time until marketing the growing pigs should be graded according to size into as many lots as convenient; under the grazing system, provided there is ample trough space to feed the pigs comfortably, two or three lots will be sufficient for the growing pigs; under the intensive system, pigs are usually kept in smaller numbers.

It should be the object of the pig raiser after weaning his pigs to have them growing rapidly until they are ready to market; there should be no "store" period, but the pigs should be fed in such a way as to have them "finished," but not excessively fat, when they reach their weight range as porkers, light baconers, or heavy baconers, as the case may be.

Weighing Pigs.

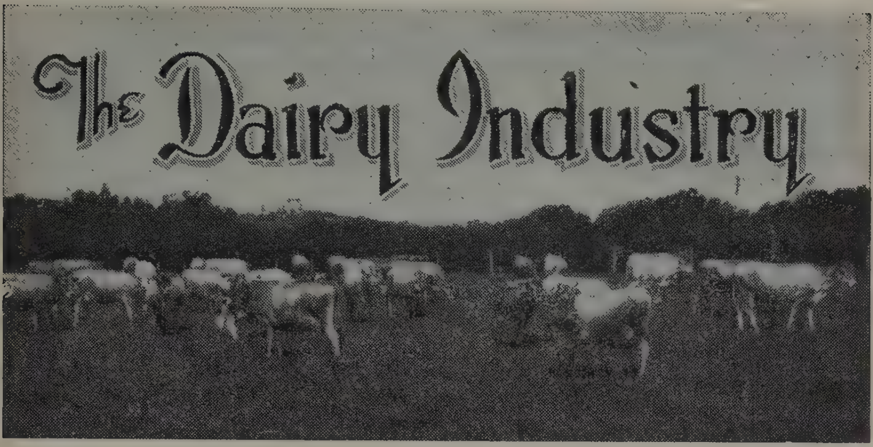
The total weight of a litter at weaning time gives a good measure of the efficiency of the sow's production and the piggery management. Work done in pig recording shows that a standard which breeders should aim at is an average of eight pigs reared per litter, and an average weight of 40 lb. per pig at eight weeks old.

As pork and bacon pigs are usually sold on a basis of weight, and as the ruling price per lb. varies according to specified weight limits, it is important to the pig raiser that he should have a fairly accurate knowledge of the weight of his animals before they are offered for sale.

Even after years of practice, guessing the weights of pigs is not so reliable as weighing them, and where regular consignments of pigs are sent from a farm the use of weighing scales can be recommended.

The weighing crate should be light yet strong; a convenient size for a crate to hold one bacon pig is 3 feet 6 inches long, 2 feet 6 inches high, and 1 foot 6 inches wide.

If the weighing crate is arranged in a race, the pigs can be brought from their pen, weighed, and then returned to the pen conveniently.



Variations in Cream Tests.

MANY dairy farmers sometimes wonder why their factory returns show variations in the fat tests of their cream. Actually, variations are bound to occur.

Conditions under which milk is separated lead to changes in cream tests, as shown by the following facts:—

The separator should always be run at the speed directed by the manufacturer. It is better to turn at too high a rate than too low, for, in the latter case, the fat loss in the skim milk is increased in proportion to the decrease in the number of revolutions.

The milk must be allowed to enter the bowl freely during separation. The level is automatically controlled by the float, and if the flow is partly shut off, a higher testing cream will result. An oversupply will result in a lower testing cream, and, more important still, excessive fat loss will occur.

Milk is at the best temperature to be separated as it comes from the cow, as it is less viscous than at lower temperatures, so runs easily through the separator, and more perfect separation of the fat results. At lower temperatures, due to the viscosity of the milk, separation becomes more difficult, with greater fat losses. It is doubtful whether any machine will do good work if the milk is below 80 degrees Fahr.

The quantity of skim milk or water used to flush the bowl usually varies considerably from day to day, and may cause a variation in the test of 2 to 5 per cent., depending on the quantity of cream. Vibration of the separator causes the skim milk and cream to be shaken together, so that they do not find their way to their respective outlets. Fat losses are increased by the escape of fat globules through the skim milk outlet.

Other factors which influence fat losses are the cleansing of the separator and the condition of the milk, but these should not cause any difficulty where there is a proper appreciation of the necessity for hygienic methods.

There is a daily variation in the fat content of the mixed milk from a herd, and this is sometimes appreciable. This affects the test of the cream, but does not influence the quantity. For example, if a herd produced 100 lb. of milk with a fat test of 4 per cent., there would be 4 lb. of butterfat, while, if the fat were 5 per cent., 5 lb. of butterfat would be the result.

—*F. C. Coleman.*

CREAM SUPPLIES DURING SUMMER.

Frequent and early delivery of cream to butter factories in summer is an important point in dairy practice. Daily delivery is not always possible in some districts, but nothing less than a four-times-a-week delivery should be the rule from October until March, inclusive.

The holding-up of supplies and delaying the cream carrier for the purpose of making certain that that morning's cream goes with the cream obtained previously should be avoided. The mixing of newly-produced warm cream with older and cooler cream is not infrequently the cause of cream being graded down on delivery at the factory platform.

Dairy farmers would be well advised to have their cream ready for the cream carrier on each morning of delivery. Should the morning's cream not be cooled down and ready on time, that particular cream should be held back for the next delivery; and, if this is done, better factory results will be obtained.

It has been reported that some dairy farmers make a practice of holding up the cream carrier for the purpose above mentioned, and, even were this not detrimental to their own cream, it is somewhat selfish and unfair to neighbouring farmers who desire their cream to arrive at the factory as early as possible.

As summer has come, the attention of all dairymen is directed to the necessity of supplying cream with a butterfat content of not less than 38 per cent.

A sound summer slogan for all cream suppliers is: "Frequent and early delivery and test around forty."

—*A. Hossack.*

COST OF SEPARATION LOSSES.

Every dairyman knows that a loss of milk-fat in separating means loss of money, but many do not realise the full extent of the loss. There is a small amount of fat which is not recoverable by mechanical separation; so this loss is unavoidable. A loss of 0·08 per cent. is not excessive, but if it is higher, either the mechanism or the manipulation of the separator is at fault.

The table hereunder will give some idea of the position when the actual loss of fat exceeds the amount which is not recoverable by mechanical means:—

Assuming that the average yield of milk is the modest amount of 1 lb. of commercial butter to 25 lb. of milk, the loss will be as follows:—

					Commercial Butter.
Loss of	0·08	per cent.	is equal to	loss of	1 lb. in 50 lb.
"	0·09	"	"	"	1 lb. in 44 lb.
"	0·1	"	"	"	1 lb. in 40 lb.
"	0·2	"	"	"	1 lb. in 20 lb.
"	0·3	"	"	"	1 lb. in 13·3 lb.
"	0·4	"	"	"	1 lb. in 10 lb.
"	0·5	"	"	"	1 lb. in 8 lb.
"	0·6	"	"	"	1 lb. in 6·6 lb.
"	0·7	"	"	"	1 lb. in 5·7 lb.
"	0·8	"	"	"	1 lb. in 5 lb.
"	0·9	"	"	"	1 lb. in 4·4 lb.
"	1·0	"	"	"	1 lb. in 4 lb.

On the same basis of yield of butter from milk, a herd of cows producing 50 gallons of milk a day will produce in one year 187,062 lb. of milk yielding 7,482 lb. of commercial butter, which at 1s. per lb. is worth £374 2s.

A loss of ·1 per cent. would cause a loss of £9 7s., and a loss of 1 per cent. would be equivalent to a loss of £93 10s.

This example will serve to emphasise how necessary it is that a separator should be maintained in perfect order and be operated continually at its correct speed.

—*L. A. Burgess.*

ESSENTIALS IN DAIRY FARM LAYOUT.

There are two necessary adjuncts to a dairy farm which are often looked for in vain—a crush and an isolation paddock.

A crush is necessary for the handling of bulls and young stock, but few dairy farms are equipped with one.

An isolation paddock is very necessary, but is rarely provided.

How many diseases could be checked if a farmer had a good isolation paddock in which he could place and watch a suspected animal, without any danger of the animal coming into contact with the rest of his herd!

SELECTING A DAIRY HEIFER.

In the selection of a dairy heifer, the form and general character will, to a great extent, indicate whether she will develop into a good producer. When a heifer is quite young, the trained eye of the judge can see its dairy value and can discern the dairy type as distinct from the beef type. The production records of her ancestral dams on both sides are important factors in determining her future dairy value, while constitution is also important.

The form of the heifer with a future as a profitable producer is, in miniature, that of a good-type, fully-developed dairy cow. Dairy characteristics are indicated by an absence of surplus flesh; she is somewhat angular and spare. The head is typical of her breed, the eyes large and bright, and muzzle large, ears of average size, neck lean and lengthy, sloping with the shoulders. She is sharp over the shoulders, ribs well sprung, with good heart girth. The forequarters are light. Digestive capacity is indicated by the depth through the barrel from the centre of the back to the navel. Good depth indicates ample capacity to convert food into milk. The greater the depth through the middle, the greater the production is likely to be. The back is straight. There is a good length from the hip to the pin bones, and from the hip to the flank. The thighs are flat and free from fleshiness; the line of the thigh is incurving. The bones should be light and not coarse. The tail should be thin and free from flesh. All of these points should indicate that there is no tendency to lay on flesh.

The udder (as yet undeveloped), milk veins and wells are reliable indications of the heifer's future value as a dairy cow. The skin covering and surrounding the immature udder is soft and loose, with teats well placed. The milk veins can be followed with the finger and milk wells gauged. Comparatively well-developed milk veins and large milk wells also are important points in judging a dairy heifer.

Registered
Hatcheries

Registered Hatcheries.

FOLLOWING is a list giving the names of the owners of hatcheries who have applied for registration up to and including the 20th December, 1938:—

Name and Address.	Name of Hatchery.	Breeds Kept.
G. Adler, Tinana	Nevertire	White Leghorns, Australorps, Rhode Island Reds, and Langshans
F. J. Akers, Eight-mile Plains	Elmsdale	White Leghorns and Australorps
M. H. Campbell, Albany Creek, Aspley	Mahaca Poultry Farm and Hatchery	White Leghorns and Australorps
J. L. Carrick & Son, Manly road, Tingalpa	Craigard	White Leghorns
Gisler Bros., Wynnum	Gisler Bros.	White Leghorns
F. J. Lambert, Acacia Vale, Townsville	Lambert's	Australorps and White Leghorns
J. McCulloch, White's road, Manly	Hinde's Stud Poultry Farm	White Leghorns, Australorps, and Brown Leghorns
A. Malvine, junr., Alva, The Gap, Ashgrove	Alva	White Leghorns and Australorps
H. L. Marshall, Kenmore	Stonehenge	White Leghorns and Australorps
J. A. Miller, Racecourse road, Charters Towers	Hillview	White Leghorns
F. S. Morrison, Kenmore	Dunglass	Australorps, Brown Leghorns, and White Leghorns
G. Pitt, Box 132, Bundaberg	Pitt's Poultry Breeding Farm	White Leghorns, Australorps, Langshans, Sussex, Rhode Island Reds, and Brown Leghorns
C. L. Schlencker, Handford road, Zillmere	Windyridge	White Leghorns
T. Smith, Isis Junction	Fairview	White Leghorns and Langshans
H. A. Springall, Progress street, Tingalpa	Springfield	White Leghorns
W. J. B. Tonkin, Parkhurst, North Rockhampton	Tonkin's Poultry Farm	White Leghorns and Australorps
R. H. Young, Box 18, P.O., Babinda	Reg Young's	White Leghorns, Brown Leghorns, and Australorps

REDUCE FEEDING COSTS.

Every effort should be made to keep production costs down to a minimum. On many farms this is being done, but on many more feeding costs are too high.

The actual cost of foodstuffs is governed by supply and demand; therefore no material saving can be made at this point. Any change in the present ration fed is of doubtful value, because such a change may result in lowering the egg yield. Again, it is doubtful whether any substitute for the existing rations would be economical. This only leaves the actual practice or management of feeding open to question.

Summed up, the cost of production is governed to a great extent by the food consumed and the wastage. Any reduction in food consumption is followed by a reduction in egg production; therefore feeding costs cannot be reduced by feeding less food.

Food wastage is an appreciable factor in feeding costs. This applies irrespective of the actual cost of foodstuffs, and is applicable to dry mash, wet mash, and grain feeding. By far the greatest wastage occurs with the dry-mash system of feeding. This fact has been pointed out to many farmers, who have immediately remedied the fault.

Faults in the construction of hoppers are the cause of nearly all the wastage that occurs with the dry-mash system. There are many different designs of dry-mash hoppers, and a plan of a suitable hopper may be obtained on application to the Department of Agriculture and Stock, William street, Brisbane. This hopper embodies other important features in addition to that of minimising wastage. The most important thing about any feed hopper is the feeding trough, which should permit ample space for the birds to eat, at the same time preventing any of the mash being wasted.

The hopper referred to embraces these features within certain limits. It also permits the mash to fall freely. It must be understood, however, that some mashes will run or feed more freely than others. Therefore, no one hopper will prevent different grades of mash overfilling the trough and allowing the mash to be readily scratched out. The hopper recommended has a lath along the front of the trough, and in the event of the mash running too freely and permitting wastage, this lath can be shifted to reduce the space. This hopper is easily and cheaply constructed.

Recently a poultry farmer installed several of this type of hopper, and although production was maintained at the same level, the hoppers brought about a saving in food costs of approximately £4 a week. Some time ago another farmer installed similar hoppers, and reduced feeding costs from five bags to three bags of laying mash each week. These two illustrations should be sufficient to demonstrate that wastage can be prevented. In the latter instance, the farmer was confident that no wastage existed on his farm.

To ascertain if wastage is occurring, a rough estimate may be obtained by looking up the purchases of foodstuffs for the previous month or a longer period. As the birds consume approximately equal quantities of mash and grain, the quantities (by weight) purchased should be approximately the same. In the event of the quantity of ingredients for a mash exceeding the quantity of grain purchased, it indicates that the excess quantity is being wasted.

A more accurate method is to count the number of birds in one shed, then empty the hopper, refill it, and record the weight of mash supplied; the period which the mash lasts will indicate the true position, as each bird will consume on an average 2 oz. of mash daily. For example, 100 birds supplied with 100 lb. of mash will consume it in eight days; if it lasted only six days each bird would be wasting 4 oz. weekly; if it lasted seven days there would be a wastage of 2 oz. per bird weekly. Such a small wastage as outlined—of 2 oz. per bird weekly —does not appear to be of great importance, but with a flock of 1,000 birds this would amount to 6,500 lb. in a year and would cost about £35, based on present feeding costs.

Present high costs of all poultry foodstuffs make it essential for every poultry farmer to eliminate wastage. By putting into practice the advice offered, wastage will be minimised and the margin of profit increased.

—*J. J. McLachlan.*

SIZE OF EGGS.

Although the internal quality of the egg is of primary importance in determining price, the factor of size cannot be overlooked. Eggs are usually graded for sale according to size; but those averaging 24 oz. to the dozen are in greatest demand, not only in Queensland, but in the markets to which our surplus production is consigned.

In these circumstances, every poultry-raiser should strive to produce eggs that meet the requirements of the market. To do this, it is necessary to select breeders that will reproduce progeny capable of laying the maximum number of eggs closely approaching 2 oz. in weight. Most poultry-keepers, when selecting their breeders, know very little about the early performance of their stock in respect of size of egg—particularly the size of egg that a hen laid during her first year of production. As a breed is more prolific during the first laying year, it is then that the egg size is of particular importance.

All pullets, when commencing to lay, produce an egg very much under-sized. Some birds take a considerable time before their eggs reach the most desirable commercial size, and others, again, may take only a week or two. As it is an inherited factor, egg size is one of the chief points to be considered in selecting future breeders. Many pullets —the breeding stock of the future—will be coming into production within the next month or so, and it is suggested that poultry-breeders who are not entirely satisfied with the size of egg from their flocks should take the opportunity of selecting and marking pullets that commence to lay eggs of a 2-oz. standard early in life. Many of these birds may have to be rejected for some purpose or other; consequently, the number selected should be large enough to allow for a reasonable percentage of rejections.

—*P. Rumball.*

MILK AS A POULTRY FOOD.

Weather conditions have been so favourable this spring that many poultry-keepers may have had an excess of skim milk. Skim milk is an excellent poultry food, and if fowls are given all the skim milk they can drink, and even if fed on nothing else but grain, they will continue to lay well.

Farmers generally appreciate the necessity of efficient feeding, and, to give their fowls the necessary amount of protein, the use of one or other of the prepared mashes is advised. These mashes are usually fed with grain, the birds being given an equal quantity of each. In these circumstances, a sufficient amount of protein is made available to the birds.

The farmer who has skim milk to give his birds may, therefore, depart somewhat from his ordinary practice, for skim milk is a protein-rich food; how far he may do so depends on the quantity of skim milk available. If the birds are given only, say, half the skim milk they will consume, half the quantity of mash that is usually fed should be supplied, and the grain increased by about 50 per cent.

It will generally be found a sound practice when milk, mash, and grain are being fed to the flock, to give the birds all the grain that they will consume, and not force them to eat given quantities of mash. This practice will largely enable the birds to balance their own ration.

—*P. Rumball.*

Plate 51.

On the Beach at Granadilla, North Queensland.

Agricultural Notes

Fallow for Winter Crops.

SUMMER fallowing methods are becoming the usual practice on wheat farms in the Maranoa district. The extension of this practice to include winter fodder crops is now advised, for although working costs may be reduced by a short preparation before sowing, the response to efficient fallowing will more than compensate for any extra outlay incurred. Financial loss through the failure of fodder crops may well equal that incurred through a failure for grain, particularly where good breeding stock are involved.

In a district where rainfall is erratic and generally of summer precipitation, there is no short cut to successful winter crop production, and without soil moisture conservation results are bound to be disappointing. Even in the past season, when abnormally heavy rains fell in May, wheat crops on fallowed land yielded more heavily and finished off better than those on unfallowed land.

The aim in preparing land for all winter crops should be the reduction of moisture losses caused by (*a*) surface run-off, (*b*) evaporation, (*c*) transpiration through weed growth. This can only be done by commencing the preparation as soon as practicable after harvest, and loosening the surface of the soil to a depth of about 4 inches and thus putting it in a fit condition to absorb moisture.

The growing popularity of the stiff shank type of implement for this purpose in loamy soils is evident in the Maranoa district, although periodic ploughing or sundercutting every two or three years will probably be an advantage.

Subsequent operations designed to reduce evaporation and control weed growth by means of the spring-tooth cultivator and harrows depend, of course, on the weather. The chief objective after completion of harvesting should be to stir the soil and catch the summer storms; the resulting crop will amply demonstrate the truth of the old saying that "Tillage is the best manure."

—C. H. Defries.

THE SCRUB TICK.

Of the many species of ticks which may attack domestic animals in Queensland, the scrub or bottle tick is one of the most important. An unfed female tick has yellow mouth parts and legs and a greyish abdomen. When engorged with blood the abdomen becomes reddish, and at this stage the female may measure up to $\frac{3}{4}$ inch in length. The male is uniformly yellowish, and never grows more than about $\frac{1}{5}$ inch in length.

The scrub tick is found among the scrubs of the eastern coast, where it lives normally on bandicoots and other marsupials. It does little harm among its native hosts, but should any domestic animal be attacked it may develop a paralysis which is frequently fatal. Dogs, cats, and sheep are most susceptible, but in the case of cattle and horses only young animals are, as a rule, affected.

Rather peculiarly, only the female ticks can cause paralysis, and the males are practically harmless. Furthermore, the disease becomes apparent only after the females have been attached for at least four days. The females are then nearly fully engorged, and the paralysis is thought to be caused by a poison which is secreted by the tick at about this time and injected into the animal. Should the tick be discovered and removed after feeding for only one, two, or three days, little harm will be done. Most cases of paralysis are seen in the spring, when, after remaining quiescent during the winter, the ticks become active again.

Dogs running in scrub tick country may be protected if given every six or seven days either a dusting with derris powder or a wash in a derris infusion. This infusion is made by soaking 2 oz. of derris powder in a gallon of water overnight and next morning adding sufficient soap to make a good lather. When being treated, the animal should also be examined for ticks in places which may not be accessible to the derris—such as inside the ears and between the toes.

For animals suffering from paralysis, a vaccine which is manufactured by the Commonwealth Serum Laboratory, Melbourne, is said to give good results. The use of a 2 per cent. solution of trypan blue is also claimed to be very effective. But no matter what remedy is tried, the more advanced the paralysis the more difficult it is to effect an improvement.

WILD SUNFLOWER—A POISONOUS PLANT.

Wild sunflower is an annual, growing about 3 to 4 feet high. It is commonly seen in clumps of a few dozen to several hundred plants. The flower is bright golden yellow, and the stalks fibrous and woody.

It is common in the Maranoa, Darling Downs, and Lockyer districts. Usually it is not eaten by stock because of its woody nature, and it is apparently only during dry periods, when other food is scarce, that cattle and sheep can be induced to eat it in any quantity.

It has been suspected of causing death in cattle and sheep, particularly in hungry stock which have been driven long distances and then brought on to country on which the plant is growing.

Wild sunflower came under suspicion recently on the Darling Downs, where some milking cows had died after having been turned into a paddock bare of most grasses but in which there were clumps of the plant in a mature state of growth. The characteristic post-mortem change was a distinct pneumonia, with some fluid in the chest cavity. Material was collected and fed to experimental animals, and there was no difficulty in producing the typical post-mortem changes, even when relatively small quantities of the plant had been given.

—C. T. White.

KIKUYU GRASS—A GOOD PASTURE BUT A BAD WEED.

Introduced from East Africa some years ago, Kikuyu grass has gained favour with dairy farmers, although many old-established stands now seem to be declining in productivity.

Kikuyu grass is a perennial which spreads rapidly over and through the ground by means of running stems. Both the surface and underground runners root freely at the nodes, anchoring the plant firmly in the ground and forming a dense turf which stands heavy trampling by stock. The stems carry a large quantity of leaf, and are very succulent. Under good conditions, Kikuyu grass makes a very dense growth, often 2 feet or more in height.

In Queensland the grass has adapted itself fairly well to different districts. It does best under warm, moist conditions, but will withstand a considerable degree of cold and keep green in spite of fairly severe frosts. For this reason, it is very valuable for late autumn and early winter feed. Its drought resistance is fairly good, and some success with the grass is reported from the Burnett and Darling Downs.

Kikuyu grass spreads most quickly and yields most heavily on loose, rich soils; and while it may provide fair grazing on some less fertile soils of a sandy or clayey nature, it is advisable to restrict plantings to rather productive soils, unless in special circumstances—such as when a grass is required for rough places or as a soil-binder to prevent erosion. Kikuyu grass makes a heavy drain on the soil, and periodical ploughing or severe cultivation is necessary to improve the soil conditions.

In Australia, Kikuyu grass sets seed very rarely, and commercial supplies are not available. It is necessary to establish the grass by planting pieces of the runners.

In addition to its value as a pasture grass, Kikuyu grass has some value for bracken control. If planted out in bracken, Kikuyu attracts stock, which trample down the fern while feeding on the grass.

Although a very valuable grass in its place, Kikuyu grass may become a troublesome weed if it is permitted to encroach on ploughed land. For this reason, it should not be planted near areas likely to be required for cultivation. In wet weather portions of the grass are often broken off by grazing animals, and these pieces may be carried on the hooves to other portions of the farm, and become established after trampling in. Patches started in this way on land required for cultivation should be dug out immediately.

—C. W. Winders.

RICE BY-PRODUCTS.

Rice grain is grown primarily for human consumption, but before it is used for this purpose it is subjected to various methods of preparation, which leave as by-products certain materials—polish, meal, bran, pollard, and hulls.

Rice Hulls.—These are the tough, flinty husks removed from the grain by threshing, and used for packing. They have practically no feeding value for stock; they contain a large proportion of silica, and may—because of the irritation they can set up—cause digestive troubles.

Rice Meal.—This should consist of the whole kernel ground after the removal of the hulls, and should include the starchy endosperm, germ, and bran coats.

Rice Bran.—This is the outer coat of the grain after the hulls have been removed; this portion usually contains most of the germ which is very liable to go rancid in storage.

Rice Pollard (Meal).—This designation is used to indicate a fraction composed of the polish, portion of the germ, part of the bran, and some starch; it really consists of the best part of the rice grain. It is sometimes refered to as "Rice Meal"; "meal," however, implies that the material is the "whole grain, ground." This substance contains only the layer between the starchy centre and bran, including a little of each of these.

Rice Polish.—This is that portion removed—after the removal of the bran—in order to produce the fine, smooth, even grain of commerce which pleases the eye; it is liable to go rancid during long storage.

Polished Rice.—The removal of the above-mentioned fractions leaves finally the starchy grain supplied by the grocer. All that is removed—consisting of the germ, protein layers, mineral matter, vitamins, and some starch—is fed to farm animals; "truly, man is wise to feed his animals so well!"

Analyses:—

	Crude Protein. Per cent.	Crude Fat. Per cent.	Crude Fibre. Per cent.	Ash. Per cent.
Rice hulls	2·0	0·5	34-40	20·0
True rice meal	8·0	2·0	8·0	..
Rice bran	11·0	10·0	13-20	14·0
Rice pollard	12·0	14·0	8·0	9·0
Rice polish	12·0	10·0	3·0	6·0
Polished rice	7·0	0·4	0·4	..

—*F. B. Coleman.*

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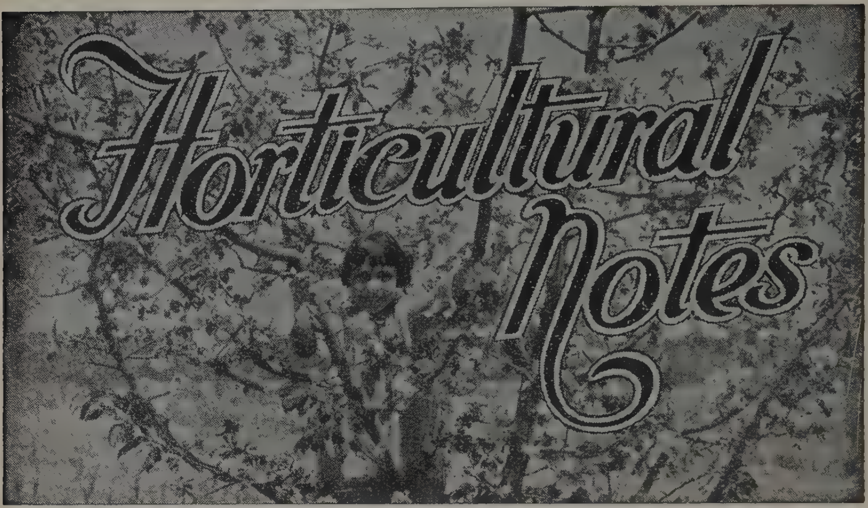

Extension Trellis for Passion Fruit Vines.

J. McG. WILLS, Fruit Branch.

THE usual practice among passion-fruit growers is to cut back vigorous lateral growth which trails on the ground to within about 6 inches of the soil surface, the reason being that fruit lying on the ground becomes badly scarred and of little value except as low-grade or factory fruit. This shortening of laterals removes a considerable amount of growth capable of carrying a large quantity of fruit. A temporary extension trellis making it possible to increase the length of laterals—the fruit-growing growth of the vines—without hampering cultural, spraying, or harvesting work is, therefore, advisable, so that growers may get the maximum yield of high-grade, unblemished fruit at a minimum cost.

The accompanying diagram illustrates a simple and cheap way of attaching an extension set of wires to existing trellises. This extension system makes possible increased lateral growth for an extra 2 feet on each side of the vine, or giving a net gain of 4 feet over the whole lateral growth of the vine. In addition, the extra shade provided by the extension gives greater protection from the direct rays of the sun for the main stem of the vine; this is very noticeable where trellises are 6 feet or more above the ground. Moreover, a greater area of ground is shaded during hot weather, and this helps to keep the surface soil at a moderate temperature, reduces the loss of moisture through evaporation, and makes weed control easier, thus reducing chipping costs and allowing more time for spraying and other jobs. After the fruit has been picked, and, if seasonal conditions are suitable, the bearing laterals should be pruned right back. The extension trellis can then be lowered out of the way beside the trellis posts, thus allowing for full use of the space between the rows of vines for the planting of small crops or the planting of green cover crops.

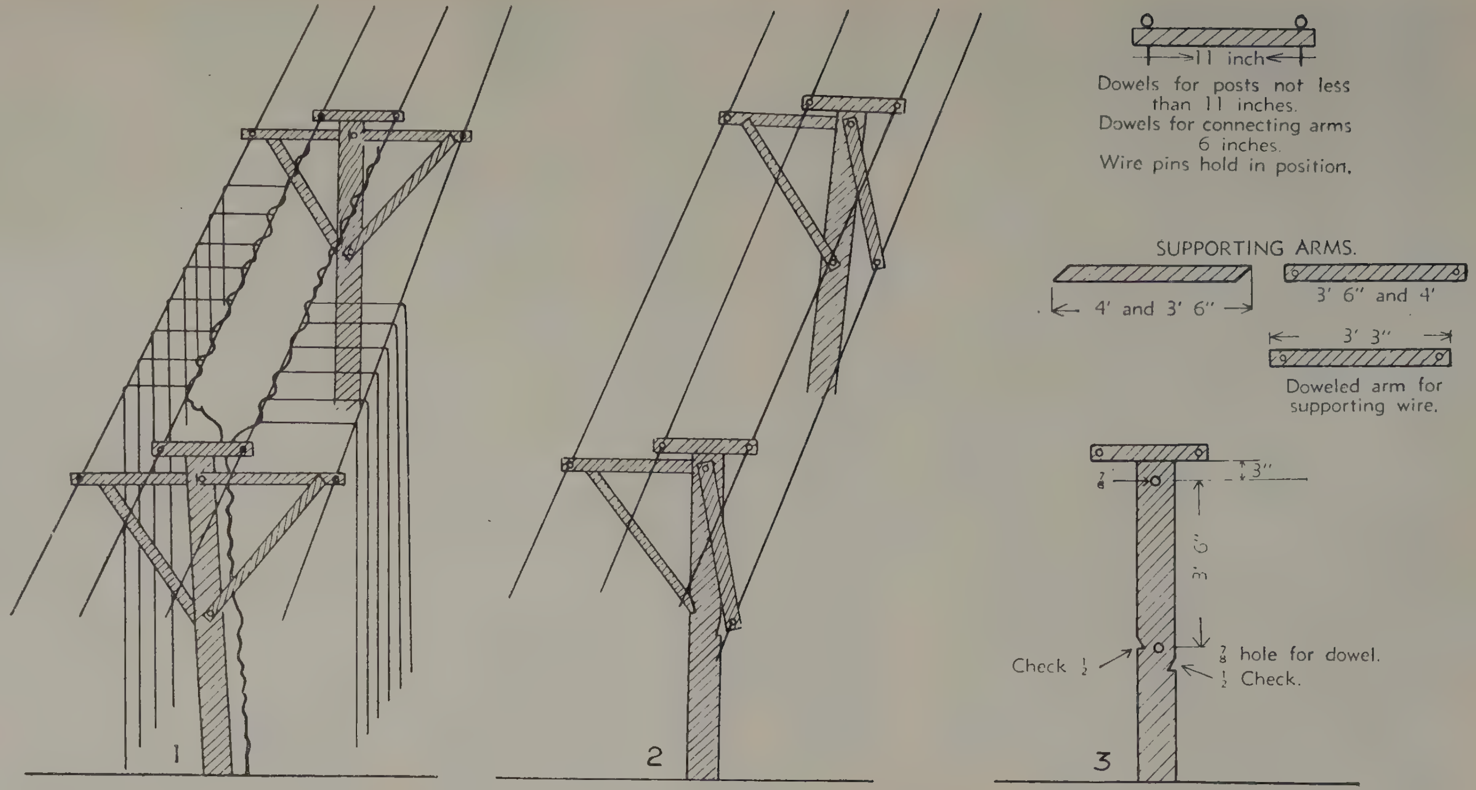
11 inch
Dowels for posts not less than 11 inches.
Dowels for connecting arms 6 inches.
Wire pins hold in position.
SUPPORTING ARMS.
4′ and 3′ 6″
3′ 6″ and 4′
3′ 3″
Doweled arm for supporting wire.
3″
7/8
3′ 6″
Check 1/2
7/8 hole for dowel.
1/2 Check.
1
2
3

Plate 52.
Diagram showing how the Extension Trellis is attached to the Main Trellis.

When the new laterals have grown sufficiently to warrant its re-erection the extension trellis can be raised into position again, the wire automatically picking up the lateral growth as it is strained to the proper tension.

The measurements given in the diagram are suitable for trellises where the rows are planted 8 feet apart. Where the planting distance is wider, the length of components may be increased, provided always that the grower can reach to the centre of the vine from either side of the trellis. The system can be installed on either horizontal twin wire trellises, or the vertical fence type. In the latter type, however, only the laterals from the leaders on the top wire should be trained over the extension. If sawn timber is used, approximately 15 feet of 2 by 1 hardwood battening is needed for an extension at each supporting post in the trellis, i.e.,—

2 horizontal arms to support wire each 3 feet 3 inches
2 supporting members each 3 feet 6 inches to 4 feet.

The few inches left over will provide sufficient material to make the dowels, which are cheaper than bolts and nuts. A $\frac{7}{8}$-inch hole should be bored about 3 inches below the top of the post to allow for the wooden dowel on which the extension arms hinge. Of course, holes of similar size are bored in one end of each extension arm, a smaller hole for the wire to pass through being bored at the other end. The arms are set on opposite sides of the post as illustrated. Dowelling is strongly recommended because the supports are not likely to be knocked out of the check notches during rough weather or when working among the vines.

The extension arms should be at least 3 feet 3 inches, or up to 3 feet 6 inches if desired, and this should allow sufficient room for the grower to reach the centre of the trellis from either side of the vine, in order to prevent the vine growth from matting and harbouring disease-infected leaves; at the same time, sufficient space is left to pass up and down the rows between the two sets of trellis.

The supporting arms should be set at such an angle as to ensure the maximum support. Wooden dowels on which the arms are hinged should be sufficiently long to allow a small hole being bored at each end. Through these a nail or wire pin can be pushed, thus holding the arms in position. The same applies to the dowel holding the arms together near the end through which the wire runs.

No. 10 gauge galvanised wire is suitable for the extension. It should be strained when the arms have been dowelled in position, sufficient length being left at the strainer post so that it can be slackened off slightly when the extension is not in use. Small iron rollers suitable for straining the wire can be purchased cheaply. The wire for the extension is run through the straining post used for the main trellis. No extension arms should be attached to the strainer. The strain on the wire should be just sufficient to support the weight of laterals without sagging between posts. When the extension is not required it may be dropped to hang down alongside the post, the dowels holding the arms together near the wire being removed to facilitate this.

It is not necessary to completely dismantle the extension if the wood used is hardwood, but if softwood is used, then it should be dismantled and stored until needed again. If the system is dismantled it will be necessary to mark or number each row, and each section of the extension; the posts also from which it is removed should have identification marks so that when required again each member can be re-erected in its original position.

MARKING TREES IN THE ORCHARD.

Because it is found impracticable to apply corrective methods immediately to drone fruit trees, or to trees known to require some specialised treatment for disease at some more opportune time, it is wise not to leave future identification of the tree to guesswork. The simplest way of marking such trees is by tying a narrow strip of cloth —preferably white—to a conspicuous limb.

In the case of individual trees giving light annual crops, pruning may be at fault. It is possible, too, that an individual tree may be a host of some serious pest that has not yet established itself throughout the orchard. The white rag indicator will serve as a reminder at a time later on when the necessary control can be conveniently applied. By marking the tree the observant orchardist also will be able to note from time to time the efficiency of the control applied.

Unsuitable varieties and poor fruit types observed during harvesting and marked are not likely to be overlooked when reworking is being done in the proper season if they can be easily identified.

—*A. M. Richardson.*

GLADIOLUS THRIPS.

The gladiolus thrips is frequently active in southern districts, and in some gardens and nurseries the blooms may be of little value.

The insect is a typical fringe-winged thrips about one-fifteenth of an inch in length and dark-brown, sometimes almost black, in colour. Normally both the adults and the small yellowish larvæ are confined to the more sheltered parts of the flower spike or the growing point, and the bulk of the injury is produced before the leaf or flower spike is unfurled. Colonies of larvæ may often be found in the small spaces between the closely-folded leaves of the plant and in the, as yet, unopened flower buds. The distinctive injury, consequently, often follows feeding on these younger parts of the plant prior to their emergence. Typical symptoms are an uneven silvering on the surface of the leaves, malformations in and discolorations of the flower spike, and a general bedraggled appearance of the plant. Though the damage to the plant is obvious, a secondary effect is lack of vigour in the corms which is frequently not appreciated. Any setback to the plant has an adverse effect on corms taken from it, and thrips injury is no exception to the rule. Control measures are, therefore, necessary.

As with most species of thrips, reproduction is very rapid, and populations may build up quickly to injurious levels. Continuous attention is, therefore, necessary, for it is much easier to retain control if treatment is applied before the plants are more or less "alive" with the insects. Similarly, corm protection is desirable to ensure freedom from infestation when planted out in the field. The essentials in control are, therefore, three:—

(*a*) Corms should be fumigated in paper bags at the rate of 1 oz. naphthalene per 100 corms for a period of one week before being stored during the off-season. A second treatment should be given just prior to planting out in the following season. If corrosive sublimate (1–1,000 for one hour) treatment is given before planting out, the second fumigation may be omitted.

(*b*) When planted out, suitable sprays should be applied as soon as the thrips appear, and at weekly intervals thereafter. If an outbreak was experienced in the previous season it is better not to wait for the appearance of the thrips but to apply an initial treatment when the plants are about 6 inches high. The most efficient spray contains Paris green 1 oz., brown sugar 2 lb., and water 3 gallons. A mist spray is desirable, and it is important to agitate the contents of the pump frequently to ensure an even discharge of the toxic ingredient, Paris green. The cost of this spray is not excessive, but it has the disadvantage of occasionally burning the leaves. A more expensive spray, suitable, perhaps, for garden purposes, is said to be equally effective and at the same time less harmful to the plants. It contains tartar emetic 2 oz., brown sugar ½ lb., and water 3 gallons.

The derris wet sprays provide a further alternative method of dealing with the thrips. Although they are somewhat less efficient than the foregoing sprays, they are very convenient to apply. Derris sprays should be mixed to the normal strength as recommended by the manufacturers, and applied to the plants weekly.

(*c*) Where possible, plantings should be arranged to allow a break of some months between seasonal operations, volunteer growth being suppressed throughout. In the absence of field hosts, the pest population will thus be at a minimum when corms are planted.

—*J. Harold Smith.*

BAGGING BANANA BUNCHES ON THE PLANTATION.

The benefits derived from bagging the bunches are not realised by the majority of banana-growers. Observations during the last five years have indicated that very definite beneficial results can be obtained by the bagging of the bunches during the whole year.

In the first place, it is necessary to point out that there is a distinct difference between the results obtained by bagging and those obtained by "cloaking," or wrapping a bag partly round the bunch. It is quite obvious that a bunch completely enveloped in a bag has more protection than one which is only partially covered; hence the improved results.

The only disadvantages of bagging are:—

1. The cost of the bags and the time required for slipping them on the bunches.

2. The extra time required when cutting the fruit, as opening the bag takes a little longer. This latter, however, can in time be practically eliminated, as growers with a little practice can estimate quite accurately whether the fruit is full or otherwise by feeling through the bag.

On the other hand, the advantages of the system are as follows:—

1. The production of fruit superior in length and circumference.

2. Uniform development, colour, and flavour of all the fruit on the bunch.

3. Greater protection of the fruit during transport to the packing shed.

4. Control of the banana thrips when used in conjunction with dusting as recommended for that insect.

5. The prevention to a very great extent of loss from sun-scorching, splitting of fruit, ravages of caterpillars and spotting bugs, undue exposure, and the spotting of fruit which occurs periodically, chiefly in low and damp situations.

6. Growers are enabled to maintain a better control of leaf spot, as all old and useless leaves can be cut off to assist in such control, there being no danger of the bunch being ruined by exposure to sun and cold. It has been observed during the last five seasons on several plantations where leaf spot has been severe and where bagging has been carried out that in the case of plants (carrying good bunches) which had been totally defoliated, when these bunches were examined the fruit was of a beautiful green colour, practically without blemish, and consisting of fully 95 per cent. of marketable fruit; whereas without bagging this fruit would have been from 75 to 100 per cent. definite loss.

—*P. Mitchell and E. L. Miles.*

SELECTING THE DEEP SUCKER IN BANANA CULTURE.

As the result of the favourable seasonal conditions, banana plantations are now making a flush of suckers. On the selection of the best sucker on each plant will depend the success of the following crop and the future life of the plantation.

The corm of a banana plant produces at least two rings of buds which at growing periods burst into growth. Of these, the top circle is about 2 inches from soil level and the lower circle is usually 2 or 3 inches below the top circle. Suckers from any of these buds do not send forth the correct follower.

At the base of the corm a bud is produced which bursts into growth at a particular stage in the life of the parent plant. From plantation trials extending over several years it has been found that the parent plant sends out the correct follower sucker when it has made three-quarters of its growth.

The maturity of a banana plant is governed, not by the time it is in the soil, but by the nature of the conditions during its growth. The deep follower produced at the right stage by the parent plant has more vitality, and its roots are deeper, and it retains its sword leaves longer. The shallow follower, on the contrary, develops its mature foliage early, and the corm rises above soil level, thereby preventing the effective functioning of its higher roots.

The careful digging-out of a three-quarter mature plant will reveal the habit of sucker formation, both shallow and deep. If suckers are planted with the side of severance downhill, the general experience is that the correct follower will invariably appear just where it is wanted —i.e., uphill.

—*J. H. Mitchell.*

The Fruit Market.

JAS. H. GREGORY, Instructor in Fruit Packing.

IN December apples reached the highest level for some years, up to 18s. per case being realised. Pineapples, after a period of alarmingly low prices, were selling at high rates, prices in the Southern States being much higher than for some time. A pleasing experience of the pineapple trade is the great improvement in packing shown in Magnetic Island consignments. Practically all consignments are arriving in good sound condition. Stone fruits are now in full supply, but are generally smaller in size than usual. New season apples are now on sale. Growers are warned against marketing small immature fruit, as its sale will not be permitted. Bananas are maintaining prices at moderate rates. Prices prevailing immediately prior to the holidays were:—

Bananas.

Brisbane.—Cavendish: Sixes, 4s. to 7s. 6d.; sevens, 4s. 6d. to 8s.; eights, 5s. to 10s.; nines, 6s. to 11s.

Sydney.—Cavendish: Sixes, 10s. to 14s.; sevens, 13s. to 16s.; eights and nines, 16s. to 18s.

Melbourne.—Cavendish: Sixes, 7s. to 11s.; sevens, 10s. to 12s.; eights, 11s. to 13s.; nines, 12s. to 14s.

Adelaide.—Cavendish: 17s. to 18s., all sizes.

Brisbane.—Lady's Finger, 2d. to 9d. per dozen.

Pineapples.

Brisbane.—Smooths, 6s. to 14s. per case; 2s. to 7s. per dozen; Roughs and Ripley's, 9s. to 13s.; few Northern higher.

Sydney.—Smooths, 10s. to 16s.; Bowen, 12s. to 18s.

Melbourne.—16s. to 20s.; choice Bowen to 22s.

Adelaide.—16s. to 18s. per tropical case.

Papaws.

Brisbane.—Yarwun, 6s. to 9s. tropical case; Gunalda, 4s. to 5s. bushel case; Locals, 2s. to 4s. bushel case.

Sydney.—3s. to 12s. tropical case.

Melbourne.—8s. to 12s. tropical case.

Some very poor quality fruit has been seen on this market. Only best quality fruit is wanted for the development of this market.

Mangoes.

Brisbane.—Fibreless varieties, 10s. to 14s. per bushel; Commons, 4s. to 7s. 6d.

Sydney.—Choice varieties, 16s. to 18s. per bushel; common varieties, 4s. to 7s. per bushel.

Melbourne.—Best varieties, 12s. to 15s. per bushel; common types unsaleable.

CITRUS FRUITS.

Oranges.

Brisbane.—N.S.W. Valencias, 9s. to 13s. per bushel.

Lemons.

Brisbane.—Locals, 6s. to 10s.; Gayndah, 8s. to 16s.; Victorian, 10s. to 16s.

STONE FRUITS.

Peaches.

Brisbane.—Locals, 6d. to 1s. per tray; Stanthorpe, 3s. to 4s. per bushel; Specials, 5s. to 7s. 6d. half-bushel.

Nectarines.

Brisbane.—5s. to 7s. half-bushel.

Plums.

Brisbane.—Stanthorpe Wilson's, 2s. 6d. to 6s. half-bushel; Shiro, 2s. to 4s.; others to 4s.

Cherries.

Brisbane.—4s. to 6s. per 12-lb. box.

Apricots.

Brisbane.—N.S.W., 6s. to 11s. half-bushel; Stanthorpe, 2s. to 8s.; small fruit hard of sale.

Passion Fruit.

Brisbane.—4s. to 6s. half-bushel; second grades lower.

Sydney.—6s. to 10s. half-bushel.

Melbourne.—4s. to 7s. 6d. half-bushel.

DECIDUOUS FRUITS.

Apples.

Brisbane.—Crofton, 13s. to 17s.; Democrat, 13s. to 17s.; Yates, 10s. to 17s.; N.S.W. Granny Smith, 12s. to 16s.

Many lines of apples would have returned better prices if placed upon the market a month or so earlier.

Good quality early cookers from Stanthorpe, 9s. to 11s.; small fruit unsaleable.

Pears.

Brisbane.—Josephine, 12s. to 14s.; Winter Cole, 12s. to 17s.

Grapes.

Brisbane.—Local Whites, 4d. to 6d.; Blacks, 5d. to 8d.

Tomatoes.

Brisbane.—Local Ripe, 2s. to 6s.; Coloured, 4s. to 9s.; Green, 2s. to 8s.

MISCELLANEOUS (BRISBANE).

Cabbages.—6d. to 3s. per dozen; *Stanthorpe* to 8s. bag.

Beans.—5s. to 7s. sugar bag.

Peas.—6s. to 7s. 6d. sugar bag.

Sweet Potatoes.—2s. to 3s. bag.

Lettuce.—1s. to 3s. per dozen.

Pumpkins.—3s. to 5s. per bag; *Melbourne*—£7-£9 per ton; *Sydney*—7s. to 9s. bag.

Beetroot.—2d. to 8d. bundle.

Cucumbers.—5s. to 9s. bushel case; 6d. to 2s. dozen.

Marrows.—1s. to 3s. dozen.

Chokos.—6d. to 9d. dozen.

PUBLICATIONS.

A leaflet on marketing cherries is now available free on application to the Department of Agriculture and Stock.

The COTTON INDUSTRY

Thinning and Spacing of Cotton.

THERE is a decided tendency amongst many growers in Queensland to refrain from thinning their cotton crop. This has been brought about in an attempt to reduce cost of production; particularly is this true of growers with large acreages. Experiments carried out by the Department of Agriculture and Stock in conjunction with co-operative farmers have definitely proved, however, that thinning cotton is necessary under most conditions.

Unthinned plants always tend to be more sensitive to climatic conditions. In wet seasons, particularly if on soils of a fertile nature containing a high nitrate content, unthinned plants generally grow tall and spindly, which results in the loss of a bottom crop through the suppression of the lower fruiting branches. Under such circumstances the crop of bolls usually forms late and is thus subjected to the sucking insects that occur generally in greater numbers during the latter part of the season. The lint produced under such conditions is frequently of a wasty, weak nature, containing a high proportion of stains and yellow spots. In dry seasons when plants are left unthinned, the competition for moisture and plant food soon becomes acute, causing the loss by shedding of the middle and top crops of flower buds, small bolls, and finally restricts the development of the remaining bolls, which frequently open prematurely. Such restriction of boll development generally lowers the quality of the cotton contained therein, the fibres usually being short, weak, and of a wasty type.

The fact that soils and climatic conditions and the habit of growth of the variety exercise a determining influence on what is the best spacing, makes it advisable for each grower to carry out spacing tests over a series of years, to ascertain the most suitable spacing for his conditions.

Definite results have been obtained, however, that indicate spacings of 20 to 24 inches are necessary for normal plantings on the harder, less-fertile clay loams and loams of the forest slopes, particularly in the drier districts where the drought resistant, more vigorous varieties, such as Lone Star and Mebane, are required. In cases where late planting is effected, spacing around 18 inches may be advisable as fewer bolls per plant are likely to develop in late-planted crops, and the extra number of plants per acre may make up the deficiency.

The results that have been obtained on the alluvials where varieties such as Indio Acala, Miller, New Boykin, and Half and Half are grown, have been more variable, but the general indications have been that from 12 to 15 inches spacing when the plants are from 5 to 8 inches tall, can be relied upon to yield well over a series of years, and the quality of the fibres will not be seriously affected by the ordinary adverse climatic conditions likely to be experienced.

The results of time of thinning experiments indicate clearly that it is best to thin when the plants are from 5 to 8 inches high, as this prevents the plants from growing tall and spindly and reduces competition for moisture and plant food. If the field has been cultivated and cross-harrowed to eliminate early weed growth, the thinning operations can be performed easily and rapidly when the plants are at this stage.

In thinning, or ''chopping'' as this operation is frequently called, it is necessary to have the hoe sharp, a light goose-neck type being the most suitable, with the length of the handle adjusted to suit the operator. The plants should be chopped just below the surface of the ground to prevent their regrowth. Where this method is used, the same stroke removes any young weed or grass growth in the row, thus resulting in a greater efficiency being obtained that allows of a larger acreage being thinned per day per man with a lowering cost of production.

After the thinning operation is completed, a thorough cultivation should be given as soon as possible to re-establish the mulch between the rows and around the plants. Generally not more than three or four cultivations should be required after the one immediately following thinning, if cotton is grown in rotation with Rhodes grass, but more may be necessary in old cultivations. At each of these operations it is recommended that the soil be worked towards the plants, as this not only helps to control weed and grass growth, but establishes a brace around the plants which assists in preventing them from being blown over during severe storms when the soil is wet.

—R. W. Peters.

CULTIVATING YOUNG COTTON.

Suitable planting rains have occurred in most of the cotton districts; so weeds are likely to become troublesome over extensive areas, particularly where cotton is being grown on old cultivations.

If showery conditions are experienced when the plants are young, the most economical way to prevent grass and weed growth and to re-establish the surface mulch is to harrow across the rows with a spike-tooth harrow, with the teeth set at a slightly backward angle so that they will not penetrate too deeply. This method will not only cheapen the cost of cultivation by lessening the amount of hard chipping, but will tend to thin out the sand somewhat; which will be beneficial if a 15 to 20 lb. rate of sowing has been applied. This method is not suitable if the land contains trash on the surface.

As soon as the rows are well defined, a thorough cultivation should be given as close to the rows as possible without covering the seedlings with soil. For this purpose the wiggle-tail type of machine, where the steering is controlled by the driver rather than the horse, does very good work, particularly if the soil fenders are used, as cultivating to within a few inches of the plants can be accomplished without too much soil being moved against them.

In most seasons, this cultivation should establish a good mulch and check the early weed or grass growth sufficiently to enable the cotton seedlings to become well established.

In many seasons it will not be necessary to cultivate more than once after the seedlings appear before the plants are ready for thinning. In a wet season, however, such showery conditions are usually experienced that on old cultivations summer grass and pigweed seedlings become established around the plants to such an extent that cross-harrowing will not remove them. Where this occurs, it is advisable, before thinning, to use disc cultivators, with the discs set to throw the soil from the plants, to a depth of 3 inches. This operation will cut away the grass and weed growth and leave only a narrow strip of plants, weeds, and grass. With the crop ''barred off'' in this manner, one stroke of the hoe will generally remove the remaining grass and weed growth, as well as any cotton plants required to be chopped out. As soon as the thinning is completed, the field should be cultivated with a tine-equipped machine with the inner tines set to throw the soil around the plants, thus establishing a good mulch to reduce evaporation and brace the plants.

In some instances in past seasons, after the cotton has been thinned, growers have experienced difficulty in maintaining clean cultivation on old cropping areas during prolonged showery periods. Under such conditions, summer grass grows so rapidly as to soon become too well established for eradication by ordinary methods of cultivation. Growers who have been faced with this difficulty have found that satisfactory control of the grass can be obtained with the walking mouldboard plough. The method most used is to plough away from the cotton plants, running the plough as closely as possible to them, and set shallow so as not to cut the lateral roots excessively. The return trip is made in the same centre, cutting away from the adjacent row. The completed round not only cuts away the grass and weeds from the cotton, but also throws soil over the growth between the two rows, thus tending to smother it sufficiently to allow of satisfactory growth of the cotton plants.

A week later the process is reversed, the ploughing throwing the soil back to the cotton plants to prevent excessive drying-out around them, and also smothering weed growth between the plants and killing the growth remaining in the centre which was not ploughed at the first operation.

—*R. W. Peters.*

Plate 53.

A Bend in the Barcoo River, near Barcaldine, Central Western Queensland.

PRODUCTION RECORDING.

List of cows and heifers officially tested by Officers of the Department of Agriculture and Stock which have qualified for entry into the Advanced Register of the Herd Books of the Australian Illawarra Shorthorn Society and Jersey Cattle Society, production charts for which were compiled during the month of November, 1938 (273 days unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORNS.				
JUNIOR, 4 YEARS (STANDARD 310 LB.).				
Burradale Lovely 9th	W. F. Kajewski, Glenroy, Glencoe	7,806·40	326·941	Empress Kitchener of Burradale
SENIOR, 3 YEARS (STANDARD 290 LB.).				
Sunlit Farm Rose	W. H. Sanderson, Mulgeldie	9,756·3	347·703	Kalinga Vesta's Prince
Glenroy Millie	W. F. Kajewski, Glenroy, Glencoe	8,360·05	335·131	Park View Glider
Rhodesview Kitty 11th	W. Gierke and Sons, Helidon	8,390·64	323·608	Rhodesview Red Knight
JUNIOR, 3 YEARS (STANDARD 270 LB.).				
Rhodesview Kitty 13th	W. Gierke and Sons, Helidon	8,402·86	310·164	Blacklands Prospector
Rhodesview Biddy 14th	W. Gierke and Sons, Helidon	7,771·42	272·965	Blacklands Prospector
SENIOR, 2 YEARS (STANDARD 250 LB.).				
Valera Sheila 3rd (254 days)	M. C. and A. M. Sullivan, Pittsworth	7,516·97	306·544	Rosenthal Lord Bine
Glenroy Emerald 3rd	W. F. Kajewski, Glenroy, Glencoe,	8,175·0	303·802	Park View Glider
Valera Tiny 2nd	M. C. and A. M. Sullivan, Pittsworth	6,940·49	272·665	Daphne's Boy of Blacklands
Penrhos Buttercup 3rd	C. H. Wethered, Canning Downs South	6,093·05	253·552	Rosenthal Pendant's Prince
JUNIOR, 2 YEARS (STANDARD 230 LB.).				
Applegarth Rosaline	W. H. Sanderson, Mulgeldie	6,799·1	283·609	Greyleigh Crowner
Newhaven Isabel	E. O. Jeynes, Raceview	6,856·97	279·774	Fairy Bower Brilliant

JERSEY.

	SENIOR, 4 YEARS (STANDARD 330 LB.).			
Pretty Maid X. of Grassmere	G. Schroder, Warra	7,972·33	363·131	Grassmere Duke
	JUNIOR, 4 YEARS (STANDARD 310 LB.).			
Carnation Sweet Jess	H. G. McKnight, Gowrie Junction	6,577·0	348·775	Carnation Lucy's Ginger
Romsey Queen Rose	J. Wilton, Raceview	5,708·51	341·797	Retford May's Victor
	JUNIOR, 3 YEARS (STANDARD 270 LB.).			
Glenview Cherub	F. P. Fowler and Son, Glenview, Coalstoun Lakes	6,285·4	361·487	Trinity Governor's Hope
Lermont Cowslip	J. Schull, Oakey	5,539·9	275·357	Woodside Golden Volunteer
	SENIOR, 2 YEARS (STANDARD 250 LB.).			
Westbrook Sylvia 2nd	The Farm Home for Boys, Westbrook	6,333·4	344·157	Oxford Golden Dreamer
Glenmoore Spotted Pansy	L. J. Comiskey, Warra	5,915·43	310·85	Diamond King of Glenmoore
	JUNIOR 2 YEARS (STANDARD 230 LB.).			
Westbrook Lucy 2nd	The Farm Home for Boys, Westbrook	5,951·95	327·946	Oxford Gem's Ambassador
Westbrook Safety 14th	The Farm Home for Boys, Westbrook	6,440·5	322·243	Oxford Gem's Ambassador
Grange Vale Bonita	T. Gillespie, Ravenshoe	5,448·35	317·907	Banyule Supremacy
Grange Vale Glory	T. Gillespie, Ravenshoe	4,336·5	265·565	Banyule Supremacy

General Notes

Staff Changes and Appointments.

Mr. C. B. Buxton, Police Magistrate, Innisfail, has been appointed also chairman of the Goondi, Mourilyan, South Johnstone, and Tully Local Sugar Cane Prices Boards, and an agent of the Central Sugar Cane Prices Board for the purpose of making inquiries under section 5 (2A) of the Regulation of Sugar Cane Prices Acts in regard to sales and leases of assigned lands, in the place of Mr. R. H. Allen, transferred.

Constable J. A. Reimer, Miles, has been appointed also an inspector under the Brands Acts.

Mr. R. H. Nissen, manager of Warrinilla Station, Rolleston, has been appointed an acting inspector of stock.

Messrs. D. C. Redmond, H. L. Pysden, and C. Schindler (Warwick), C. G Martin (Green Island, via Cairns), A. W. Kirke (Lake Eacham, Yungaburra), and H. L. Lipke (Imbil) has been appointed honorary protectors under the Fauna Protection Act, and honorary rangers under the Native Plants Protection Act.

Mr. F. Caine, Inspector of Stock, has been appointed District Inspector of Stock, Department of Agriculture and Stock.

Constable M. P. O'Shea, Emu Park, has been appointed also an inspector under the Slaughtering Act.

Mr. H. E. Ball, Yeppoon road, via Rockhampton, has been appointed an honorary protector under the Fauna Protection Act.

Stanthorpe Fruit and Vegetable Levy.

The Stanthorpe Fruit and Vegetable General Levy Regulation in force under the Fruit Marketing Organisation Acts has been extended for a period of two years as from the 23rd December, 1938. The Regulation, which came into operation in its present form in 1936, has been extended previously for twelve monthly periods.

State Wheat Board.

Executive approval has been given under "*The Wheat Pool Acts*, 1920 *to* 1930," to the appointment of Mr. W. A. Dean (Warwick) as chairman of the State Wheat Board for the period from 24th October, 1938, to 31st August, 1941. In addition, Messrs. J. G. Tod (Goomburra), A. C. V. Bligh (Condamine Plains), W. J. Brimblecombe (Pirrinuan), T. W. McIntyre (Yarranlea), and R. Wilson (Acting Director of Marketing) have been appointed to the Wheat Board for the abovementioned period.

Pig Importation Restriction.

An Order in Council has been issued under the Diseases in Stock Acts prohibiting the introduction into Queensland of any infected or suspected swine from New South Wales and Victoria unless such swine are accompanied by a declaration by or on behalf of the owner, and a certificate of health signed by a Government veterinary surgeon or inspector of stock that they are free from disease and have not been in contact with pigs suffering from swine dysentery.

Contagious Bovine and Porcine Abortion.

An Order in Council has been issued under the Diseases in Stock Acts, declaring contagious bovine abortion and contagious porcine abortion to be diseases under and for the purposes of the abovementined Acts. A regulation, also approved to-day, provides that the owner or person in charge of any cow or sow which has aborted shall notify the nearest inspector thereof, and shall insolate such animal.

Butter and Cheese Boards.

Orders in Council have been issued under the Primary Producers' Organisation and Marketing Acts extending the operations of the Butter and Cheese Boards, respectively, for the period from 1st January, 1939, to 31st December, 1941.

Milk Supply Act.

By proclamation, "*The Milk Supply Act of* 1938" came into force on 12th December, 1938.

Egg Board.

The election of five growers' representatives on the Queensland Egg Board resulted as follows:—

	Votes.
District No. 1.	
A. C. M. Smith, Gooroolba	69
R. B. Corbett, Woombye	66
District No. 2.	
F. S. Morrison, Kenmore, *via* Indooroopilly	107
M. H. Campbell, Albany Creek	77
District No. 3.	
T. Hallick, Wynnum	159
C. Hodges, Kuraby	119
District No. 4.	
J. De Vris, Rosewood	Unopposed.
District No. 5.	
	Votes.
O. A. W. Evans, Warwick	63
W. T. Hughes, Toowoomba	51

An Order in Council has been approved under the Primary Producers' Organisation and Marketing Acts, which extends the operations of the Queensland Egg Board for the period from 1st January, 1939, to 31st December, 1944.

Dairy Products Stabilisation Board.

An Order in Council has been issued under "*The Dairy Products Stabilisation Acts,* 1933 *to* 1936," providing that the Dairy Products Stabilisation Board shall continue in office for a further month—that is, until the 31st January, 1939. The present Board was constituted for the period from 1st May, 1936, to 31st December, 1938.

Rural Development Board.

"*The Rural Development Transfer and Co-ordination of Powers Act of* 1938" came into operation on the 22nd December, 1938.

An Order in Council has been issued under the Act constituting the Rural Development Board, and appointing Messrs. Robert Wilson (Representative of Department of Agriculture and Stock), E. A. Crosser (Representative of Treasury Department), and J. L. Callaghan (Representative of the Land Administration Board) to be the members thereof as from the 1st January, 1939. Messrs. Wilson and Callaghan have been appointed Chairman and Deputy Chairman, respectively, of the Board.

Papaw Levy.

The Papaw Levy Regulation which has been in force under the Fruit Marketing Organisation Acts for a number of years has been repealed, and a new Regulation empowering the Committee of Direction to make a levy on papaws for a period of one year from the 10th December, 1938, has been issued in lieu thereof.

The levy now to be enforced, in addition to being used for defraying the expenses of advertising in the interests of the papaw-growing industry, will also be a contribution by the Committee of Direction towards the salary of a papaw research officer employed by the Department of Agriculture and Stock.

The amount of the levy shall be, on papaws sold or delivered, whether by rail, road, or boat, to factories, at the rate of 3s. 4d. per ton; on papaws sold or delivered by rail to persons or firms other than factories, at the rate of 1s. 8d. per ton, and on papaws sold or delivered otherwise at the rate of 1d. for every two cases, or part thereof. The levy on all papaws railed from any Queensland railway station (other than Toowoomba, Central, Roma Street, Brunswick Street, Woolloongabba, and South Brisbane) to any other Queensland railway station may be collected by the Commissioner for Railways to the extent of 1s. 8d. per ton, inclusive of cases, with a minimum of 1d.

Wild Life Preservation.

An Order in Council has been issued under the Fauna Protection Act declaring properties in the parishes of O'Connell, Rodd's Bay, and Polmaily, in the Shire of Miriam Vale, to be a sanctuary under the abovementioned Act.

Answers to Correspondents

Shade Trees in the North-West.

J.J.O'S. (Bookin, G.N.R.)—

1. Weeping Fig, *Ficus Benjamina.*—You asked especially about this. They make very handsome trees, and we think would be all right, provided you could give them protection from the winter frosts in their early stages. We would advise you to get large plants of these in petrol tins or similar receptacles from the Botanic Gardens, Townsville.
2. Queensland Nut, *Macadamia ternifolia.*—We think this would do quite well in your district. Plants are obtainable through the ordinary commercial channels, or if you want particular varieties you could get them from Mr. W. R. Petrie, Petrie, North Coast Line, a nurseryman who makes a speciality of these and other nut-bearing plants.
3. Bottle Tree—narrow-leaved variety, *Sterculia rupestris;* broad-leaved variety, *Sterculia trichosiphon.*—Both these should do quite well in your locality. The former is the better of the two in your district. If not obtainable through the ordinary commercial channels you may probably get some plants through the Brisbane City Council, either from the Botanic Gardens nursery or the Department of Parks and Gardens. The usual charge is 2s. a plant.
4. Currajong, *Sterculia diversifolia.*—Obtainable from commercial nurseries.
5. Acacia, *Albizzia Lebbek.*—This is the common acacia of the West, and it does remarkably well, although rather subject to borer attack. You may probably obtain plants from the Botanic Gardens, Townsville, or Rockhampton.
6. *Acacia arabica.*—Makes a beautiful tree in the West. If not obtainable elsewhere we think you could get plants from the Botanic Gardens, Rockhampton, at, probably, about 2s. a plant.
7. Chinese Celtis, *Celtis sinensis.*—This is commonly called Portuguese Elm, and does remarkably well in western localities. It is deciduous, but in the summer makes a beautiful umbrageous head. This applies to the bottle trees. It is raised in the Brisbane Botanic Gardens in fair quantities, and we think the Curator may supply you with plants. At present, we do not think it is generally in trade. It is a tree very strongly recommended.
8. Parkinsonia Tree, *Parkinsonia aculeata.*—You may object to this on account of the thorns and its tendency to run out and become more or less of a pest.
9. White Cedar, *Melia dubia,* does well in the West. Plants are obtainable through most of the ordinary commercial nurseries.
10. Pepper Tree, *Schinus molle.*—Same remarks apply as to White Cedar.
11. *Bauhinia Hookeri,* Native Bauhinia.—We have several native Bauhinias, and this is one of the best. It is a very slow-growing plant, but eventually makes a beautiful tree. We think the Botanic Gardens, Brisbane, or the Brisbane City Council nursery may supply it.
12. Camphor Laurel, *Cinnamomum camphorum.*—We think this is worthy of a trial.
13. Citron Gum, *Eucalyptus citriodora.*—We think it is worth growing; if lopped it makes quit a good head.

Needle Burr.

WIDGEE (Gympie)—

The specimen is needle burr, *Amarantus spinosus,* a weed with a wide distribution in the tropical regions of the world. It is very common in North Queensland and is now and again seen in more Southern parts. We have seen it in the Numinbah Valley, about Brisbane, and about Rosewood, but it does not seem to have spread widely in any of these areas. It has been declared noxious in three Northern shires—Herbert, Eacham, and Hinchinbrook. The plant is not known to possess any poisonous or harmful properties. The young shoots and leaves, like other species of Amarantus, have been used by Asiatics as a substitute for spinach.

Soil-saving Plants.

A.M.McL. (Springsure)—

For planting on black-soil gullies to prevent erosion, the following are some suggestions:—

Cynodon plectostachyum, related to the common couch grass. It has been introduced by the Department of Agriculture and Stock.

Digitaria eriantha, woolly finger grass, worthy of a trial. *Panicum makarikariensis*, this is a rather coarse panicum, probably of not much value as a fodder, but useful for your purpose. The Department imported roots some time ago, and now have it growing well.

Yellow Cockspur.

J.T.S. (Warwick)—

The weed specimen is *Centaurea solstitialis*, variously known as yellow cockspur thistle, yellow star thistle, or St. Barnaby's thistle. In Queensland, it is probably best known as "star thistle," although this local name more correctly belongs to an allied species naturalised in the Southern States, but which, so far, has not made its appearance in Queensland.

The yellow cockspur is a native of Southern Europe, and is now naturalised in many countries. It is a much more abundant weed in the Southern States than in Queensland. It is not known to possess any poisonous or harmful properties, but can become a pest.

Cape Cotton.

G.T. (Waterford)—

The specimen is the Cape cotton or balloon cotton, *Gomphocarpus fruticosus*, a native of South Africa, now a naturalised weed in many countries. It is very abundant at times in parts of Queensland, and can become a very serious pest. It has been accused of poisoning stock, and feeding tests carried out at the Animal Health Station, Yeerongpilly, prove that the plant is definitely poisonous. Generally, however, stock do not normally eat it in sufficient quantities to cause trouble.

It is quite a handsome plant, and on this account is sometimes allowed to remain in gardens. The fluff inside the balloon-like pods is of no value as a cotton, but the inner bark on the stems yields a very strong tough fibre.

Wild Heliotrope.

W.J.G. (Mount Esk Pocket, via Esk)—

The specimen is wild heliotrope or blue-topped heliotrope, *Heliotropium anchusiæfolium*, a native of South America, now a naturalised weed in Queensland and the Southern States. Though a heliotropium, it is most commonly known in Queensland as "wild verbena," and has caused much concern on the Darling Downs, particularly around Warwick. It is not known to possess any harmful or poisonous properties.

Chicory.

J.W.M. (Groomsville, via Pechey)—

Your specimen is chicory, *Cichorium Intybus*. The cultivated form of the chicory possesses a big carrot-like root, which is much used in Europe as an adulterant of coffee. When it runs out and becomes wild, the root becomes comparatively thin and spindly. It is quite naturalised in Australia, and is something of a pest in the Southern States, particularly South Australia. It has been established in Queensland on the Darling Downs for some years, but does not seem to have spread to any great extent. We were interested in your remarks about stock eating it.

Burr Trefoil.

S.C.S. (Mackay)—

The specimen is the burr trefoil, *Medicago denticulata*, a plant very widely spread in Australia and in Queensland, most abundant on the Darling Downs. It is generally regarded as an excellent fodder, particularly for sheep. On the whole, it seems to be preferred when it is drying off somewhat, and not when green and luxurious. It has the advantage that it is one of the few winter-growing legumes which can be said to thrive under Queensland conditions. The only objection to the plant are the burrs, which cling to the belly-wool of sheep.

Rural Topics

Fat Lamb Experiments in Victoria.

Here are some interesting results from fat lamb investigations at the Rutherglen Experiment Farm, in Victoria. There it has been proved practicable to carry from May to November 2¼ large-framed ewes and their lambs to the acre on improved pasture; and sufficient feed remains to carry the ewes and unsold lambs from December to April. In addition, it has been possible, in some seasons, to conserve considerable quantities of pasture hay and silage. Heavier stocking would have resulted in poorer fattening of lambs, less wool per ewe, or the necessity for heavy hand feeding in some seasons, while lighter stocking would have given larger lambs, fewer "reject" or "carry-over" lambs, but a smaller possible output. Victorian weather conditions differ very much from those of Queensland—it must be remembered that substantial winter rainfall is the usual experience down South—still, fat lamb investigations there are naturally interesting to Downs farmers who are either engaged in lamb raising or are thinking about starting in that industry.

Except for short periods, all sheep and lambs were grazed together, the flock moving from paddock to paddock.

The Border Leicester rams produced average lambs of heavier dressed weights than did the Southdowns. The Southdown rams produced a larger percentage of first-quality lambs than the Border Leicesters. The Southdown lambs matured earlier, and were prime at lower weights than the Border Leicester lambs—an important factor where early lambs are more valuable than mid-season lambs of equal weight or in districts where green pasture is short-lived or goes to seed early.

Results from the Dorset Horn cross were inconclusive. They were not better than the Border Leicester crosses in their return as export lambs.

Queensland Farm Horse Standards.

Stallion registration figures for the year show that Queensland's standard of horses has shown a marked rise. Four years ago, when the Government began the system of veterinary examination of stallions and certifying for soundness, the total rejections by the vets. amounted to 25.7 per cent. Last year they fell by more than half—12.8 per cent., to be exact. Every year these examinations have shown a progressive drop in the number of rejections. The natural result of this improvement in our farm and blood horse standards is that buyers are operating with much confidence in the State.

Pasture Research.

According to the *Journal of the Council for Scientific Research* (November, 1938), recent investigations have demonstrated the vital importance of protein in the production of wool fibre, and have shown that protein deficiency of natural grazing lands is an important factor limiting the extension of the wool industry, and so methods of improving pastures from that point of view in sheep country of low rainfall call for thorough investigation. To help along this good work, the Australian Wool Board has made a grant of £2,000 for the present year.

Those Whom the Farmer Feeds.

Speaking at a public gathering at Toowoomba recently, the Government Statistician, Mr. Colin Clark, said that the average Australian farmer or farm worker at the present moment is feeding himself and his dependants and three other workers in Australia and their dependants and about four workers overseas and their dependants. He added: "It is precisely because of the great productivity of the rural producer in Australia that we are able to feed without difficulty the large town population which we have in this country—feed a town population or non-agricultural population who now number 75 per cent. of all the Australian people, and who are by no means able to consume all the food which the remaining 25 per cent. can produce. Taking all our primary produce together, we have to export practically half of our output."

When we come to think that out, the point that comes right home to us is that the more productive farming becomes the larger is the industrial population which it can support. So far as we can look into the future, the same trends are going to continue, but, as Mr. Clark pointed out, the agricultural and pastoral industries are becoming more and more efficient, and as a result they are able to support a larger and larger town population. The town people are, of course, not fed for nothing. They, in turn, produce what the farmer needs while providing the farmer with his home market, which is his best market.

South Australian Experience of Soil Erosion.

The committee appointed by the South Australian Government to investigate soil erosion in that State has presented a valuable report and which has a definite interest for Queensland farmers. The report lays great emphasis on the danger of over-stocking, which is a constant menace in country liable to drift.

If the report does nothing else, it will at least arouse public opinion. Boiled down, its major conclusion is that we must change our ways in the use of land.

"Change the system!" is the easy answer to everything, but it does not follow that to change the system settles anything. It does not make the spendthrift suddenly thrifty, for instance, nor the careless careful. The essential change comes slowly in the experience of men and women. Generally it comes under pinch or under conditions which lead to a pinch. "He is the greatest patriot who stops the most gullies."

Price and Consumption.

The organisation of world supplies to the British market is now so stabilised that it may safely be assumed that the average prices over the last five-year period are not likely to be exceeded. Since price governs consumption, a higher range of values cannot reasonably be expected. Towards the end of 1937 a sharp increase in the price of butter was followed by a marked fall in its consumption. In the United Kingdom the apparent consumption of butter was estimated at a little more than 24 lb. a head, as against 25 lb. in 1936, when prices were lower. On the other hand, margarine consumption rose to nearly 9 lb. a head last year. This factor of price and consumption has to be closely considered, and if profitable results are to be maintained farmers will be more than ever driven back to the issue of cost of production.

Importance of Farm Manure.

For every pound of grain, hay, straw, or other produce taken from the soil there is a certain loss of plant food elements. When the crops are sold from the farm the loss is equal to the total amount of plant food taken up by the crops. When the crops are fed to the livestock on the farm the loss is somewhat smaller, for much of the plant food is returned to the soil in manure. Farm manures are an important and valuable by-product of the farm.—*The New Zealand Farmer.*

Mowing Pastures.

A farm practice that pays big dividends is mowing pastures wherever it is practicable. Where there is any quantity of uneven grass or weeds ungrazed the cows will do a much better job of grazing afterwards and the weeds will be better controlled if the mowing machine is used. The earlier this is done the better, but any time during summer is good.—*The New Zealand Farmer.*

Milking Goats in Germany.

Everyone who has lived in the mining and western pastoral centres in Queensland has an appreciation of the goat and its value in domestic economy. From Germany comes the news that in addition to organising milk production from dairy cows the German Government is encouraging an increase in the number of milking goats. During the war German goat herds increased to 4,600,000 head, but after the war goats were neglected. Last year's efforts brought the number to 2,400,000. German experts are now teaching the people that the annual yield of buttermilk from one goat covers the whole needs of one citizen, and that each additional goat means an advance in the nation's supply of edible fat. Every German working man who has the means of rearing it has been promised a first-class goat to enable him to improve his standard of living.

Cows are Cows.

Some people say that milking should be so done that there would be no need for a strainer. A fine thought that, and we would all like to agree, but cows are cows and dairy workers are dairy workers—all of which means that a strainer is pretty much a necessity in every dairy. Now we all use a strainer to prevent foreign material from getting into the can. Look at the strainer you are now using, and ask: "Is it doing that job?" If you are using a cloth, how about the answer? It may be right if the cloth is boiled after every milking and kept in the sunlight and free from dust. If you are using a fine mesh brass wire strainer, take a tooth pick and dig into the seams. Are there any "wogs" being washed into each can as the milk passes through the strainer? Or is the strainer broken away from its frame? Maybe it is badly dented and thus not easily washed.

A good strainer is easy to clean, has no seams, is fitted with cotton pads that are thrown away after use, and protects the cotton from damage as the milk is poured in.

Science and Farming.

Science with practice is a familiar and commendable motto. Its application is largely negatived, however, if the farmer knows so little of the sciences on which the principles of his practice are based that much of the work he does is hidden from him as to purpose, and he follows disinterestedly along the paths he is advised to be the best. How much or how little, or rather what standard of education does a man to be a successful, intelligent, and progressive farmer require? The subject has been discussed in many moods and tenses. Commissions have explored it and agricultural experts without number have pronounced opinions on it. Many take the view that the teachings of agricultural science require to be translated to the farmer rather than that he should be expected to grasp them through his own understanding. Others hold a contrary opinion, and would have the education of the farming community so thorough and complete as to ensure competence to undertake every phase of farm work.

An advocate of the latter proposition argues that sooner or later some guarantee of efficiency for the productive occupation of land will be demanded from the man who wants to be a farmer. If that ever comes to pass, education in the principles and practice of agriculture as well as in practical field work will determine whether a man will be allowed to farm or not. It sounds fantastic, certainly, but if the idea is studied closely some points will be admitted to commend it.

Half a Million Pounds Lost every Year.

The Australian Veterinary Association estimates that the dairy industry loses £500,000 in round figures every year from tuberculosis.

They point out that tuberculosis is one of the three most serious diseases of Australian cattle, and that it is of importance from both the human health and economic aspects.

We have shown by actual example that bovine tuberculosis can be eradicated from and kept out of herds and areas, and we know of no reason why the system of eradication should not be extended gradually into a continent-wide campaign. It would take some years to do, of course, but what other dairy countries can do we can do—if not go one better. The tuberculin test is the safest means of controlling the disease in cattle and so safeguarding human health and saving that half-million pounds which is definitely an avoidable loss to the dairy industry.

A Good Litter of Pigs.

A litter of Wessex Saddleback pigs bred by Mr. R. Turpin, Kentville, via Lowood, was officially weighed when eight weeks old on the 26th November, and made a total weight of 555½ lb., the thirteen pigs which were reared from the fifteen born averaging 42.7 lb. each.

The litter was from Pensilva Ace 3rd and was sired by Pensilva Vane 2nd. The dam previously produced a recorded litter of twelve pigs weighing 624½ lb. at eight weeks old.

The Concrete Mixture.

Sand that is to be used in concrete work on the farm should pass through a wire screen with one-fourth inch mesh. It should be clean and free from vegetable matter, loam, or excess amounts of clay. Gravel should range in size from one-fourth inch up to 1½ to 2 inches for ordinary concrete work. Water that is satisfactory for drinking is clean enough to use in the concrete mixture. The amount of water used should be proportioned to the cement. In most farm work use 5 gallons water to one sack of cement. If sand is wet, reduce the water to 4½ gallons. Too much water weakens the concrete.

Testing Tells the Profitable Cows.

Better herds is a prime factor in dairy progress. The only sure way of improving a herd is to have its production recorded systematically and regularly and to use a registered and pure-bred bull of known and definite production strain. First, it is necessary to ascertain the highest and lowest producers in a herd, and the only way that can be done is by having the herd recorded for production. The Herd Improvement Scheme operated by the Department of Agriculture and Stock will show the farmer the cows that are producing at a profit and those that are eating up the profits; and it is from the profitable cows only that calves should be reared for replacements to build up a herd of high producers. The scheme also gives a line on the qualities of the bull when his progeny come into profit. It is not practicable, of course, to cull out all the cows that are not up to the highest standard, but the gradual raising of the general standard of the dairy herds of the State is obviously a worth-while objective.

Orchard Notes

FEBRUARY.

THE COASTAL DISTRICTS.

FEBRUARY in coastal Queensland is frequently a wet month, with plant growth rampant. Where green cropping is not practised it is not always possible to keep weed growth in check by cultivation.

The main crop of smooth-leaf pineapples will be ready for canning, and care should be taken to see that the fruit is sent to market with the least possible delay and in the best possible condition.

Bananas for shipment to the Southern States should on no account be allowed to become over-ripe before the bunches are cut; at the same time, the individual fruit should be well-filled.

Citrus orchards require careful attention, as there is frequently a heavy growth of water shoots, especially in trees which have recently been thinned out, and which must be removed. Citrus trees may be planted now where the land has been properly prepared, and it is also a good time to plant most kinds of tropical fruit trees.

A few late grapes and mangoes will ripen during the month.

Strawberries may be planted towards the end of the month, and, if early ripening fruit is desired, care should be taken to select the first runners from the parent plants, as these will fruit quicker than those formed later. The land for strawberries should be well and deeply worked. If available, a good dressing of well-rotted farmyard manure should be given, as well as a complete commercial fertilizer, as strawberries require plenty of food and pay well for extra care and attention.

THE GRANITE BELT SOUTHERN AND CENTRAL TABLELANDS.

THE marketing of later varieties of peaches and plums and of mid-season varieties of apples and pears, as well as of table grapes, will fully occupy the attention of fruitgrowers in the Granite Belt, and the advice in these notes for the two previous months with regard to handling, grading, packing, and marketing is again emphasised.

Extra trouble taken with fruit pays every time. Good fruit, evenly graded and honestly packed, will sell when ungraded and badly packed fruit is a drug on the market.

Early in the month it will be necessary to keep a careful watch on the crop of late apples for codling moth. If there is a slightest indication of attack, a further spraying will be necessary, as the fruit that has previously escaped injury is usually that which suffers the most.

Fruit fly must also be systematically fought wherever and whenever found, and no infested fruit should be allowed to lie on the ground.

Grapes will be ready for market, and in the case of this fruit the greatest care in handling and packing is necessary. The fruit should never be packed wet, and, if possible, it is an excellent plan to let the stems wilt for a day at least before packing. This tends to tighten the hold of the individual berries on the stem and prevents their falling off.

In the western districts winemaking will be in progress. Here again care is necessary, as the better the condition in which the fruit can be brought to the press the better the prospect of producing a high-class wine.

Where necessary and practicable, citrus trees should be given a good irrigation, as this will carry on the fruit until maturity, provided it is followed up by systematic cultivation so as to retain sufficient moisture in the soil.

Farm Notes

FEBRUARY.

A LATE sowing of sorghum will provide succulent fodder during the early winter months, or if not required for immediate use, the crop may be conserved as silage or stover. The saccaline variety is favoured for this purpose, as it will withstand mild frosts, and continue to supply good feed well into the winter months.

There is still ample time to make a sowing of the early maturing millets, Japanese millet, white panicum, or French millet, if additional green fodder is desired, while buckwheat is also suitable, as it will mature in eight to ten weeks.

In the cooler districts, a first sowing of oats, barley, or wheat for grazing may be made towards the end of the month, but elsewhere March sowings will be sufficiently early.

February is regarded as the best month for planting the late or autumn potato crop, the acreage planted exceeding that of the spring or early crop, because of the increased soil moisture usually available.

Plant whole seed, preferably not less than 2 inches in diameter, and treat with hot formalin or corrosive sublimate in accordance with recommendations issued by the Department of Agriculture and Stock. Farmers who are dissatisfied with their returns, and who do not regularly apply fertilizers, would be well advised to ascertain the increased yields usually resulting from their judicious use.

First sowings may be made of mangolds, swedes, field turnips, &c., utilised for pig and cattle feed. Crops should be drilled in spaced rows so as to permit of cultivation between the rows, and the thinning of plants to suitable distances apart. Where only small areas are sown, the "Planet Jn." type of hand seeder will be found very useful. Because of the importance of increasing the area under lucerne, attention should be given to the adequate preparation of land reserved for late March-May sowings. The semi-permanent nature and value of a lucerne stand certainly warrant the best possible seed-bed, as once the crop is established only light surface cultivation can be given.

In the wheat areas, summer fallows will now be in fair condition, and with the assistance of sheep to keep down weed growth, good tilth can be maintained by the use of rigid tyne cultivators, spring tooth cultivators, and harrows. Wheatgrowers generally are well aware of the importance of maintaining a good surface mulch.

Maize and other row crops will now be well advanced, so that any cultivation given should be as shallow as possible consistent with the work of weed destruction.

The harvesting of a variety of crops will occupy much time as the season advances. Too much care cannot be given to the grading, bagging, baling, and generally attractive packing of all products placed on the open market, as inferior grades or poorly packed produce rarely realises profitable returns.

◆

SUNDAY MORNING—THE COUNTRYMAN'S SESSION.

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Plate 54.

GATHERING STORM CLOUDS OVER SHELTERED WATERS.—A beach scene near Granadilla, North Queensland.

THE HOME
and
THE GARDEN

Our Babies.

Under this heading a series of short articles, by the Medical and Nursing Staffs of the Queensland Baby Clinics, dealing with the care and general welfare of babies has been planned in the hope of maintaining their health, increasing their happiness, and decreasing the number of avoidable deaths.

HOLIDAY HINTS.

The Baby.

THE simplest of all problems is the feeding of the breast-fed baby—in fact, he is not a problem at all as far as his feeding is concerned.

The bottle-fed baby presents more difficulty. Babies fed on cow's milk are frequently upset while travelling by rail or steamer. Railway carriages are usually unsafe places for keeping milk, especially in hot weather. Unless very carefully packed in ice, the milk goes bad very quickly. It is risky to rely upon milk procured from refreshment-rooms. Thermos flasks may be dangerous holders of milk. If they are used, first thoroughly wash and heat the flask before pouring into it the milk mixture heated to just below boiling point, the mixture having been boiled for several minutes beforehand. Keep the flask well corked, and, when pouring out sufficient milk for each feed, do so as quickly as possible and recork immediately to prevent the milk in the flask falling appreciably in temperature. Germs do not grow and multiply in milk which is kept very hot—namely, about 130 degrees Fahr. If the milk cools to anywhere near blood heat the milk in the flask becomes a positive danger. The milk poured out for baby's feed can quickly be cooled to the right temperature and he can have his bottle whenever it is due, without regard to stations.

It is a good thing to take an ordinary bottle of boiled water also, as baby is very likely to be thirsty, and it is also useful for rinsing out the bottle and washing the teat. A jug of hot water obtained at a refreshment-room serves to heat water for drinking and can be used for scalding out the various utensils used in feeding.

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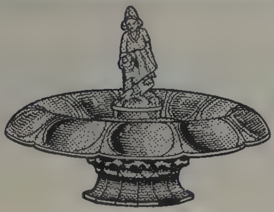

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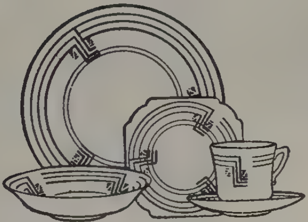

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20	2·15·7	2·6·6	2·0·10	1·16·8
25	3·10·2	2·16·4	2·8·2	2·2·7
30	4·15·3	3·11·5	2·18·10	2·10·8
35	6·9·0	4·18·0	3·15·6	3·2·6
40		6·13·4	5·2·0	4·1·8
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It is a good plan to have more than one feeding bottle and teat so that if it is difficult to wash them properly during the journey fresh ones can be used. Never keep any milk which has been left in the feeding bottle. If baby does not finish his feed throw away what is left and pour out fresh milk from the flask for the next feed. A handy way to carry the bottles and teats is to place them in a small tin box such as a biscuit box. Wrap the bottles and teats in a piece of clean boiled butter muslin and pack them into the tin. A spoon, a measure or small jug marked in ounces, and any other small utensil may also be placed in the tin.

In any journey lasting more than half a day it will be safer to carry some form of good dried milk. Boiled water can always be obtained at the stopping places or a supply can be taken from home. When changing a baby from a milk mixture to another to which he has not been accustomed, always begin with a mixture less than full strength. At the end of the journey return to the baby's ordinary food. It is better to underfeed than overfeed a baby while travelling.

Food for the Bigger Children.

The toddler may be the most difficult to cater for, but a little forethought will save much worry and trouble. Remember that a day on somewhat short rations will do no harm; whereas a day on unsuitable food consisting of odds and ends may lead to an upset.

Pack a tin with rusks of twice-baked bread, buttered or not as desired, some wholemeal bread and butter. Fruit such as oranges, apples, or papaw is useful. For the older children, sandwiches of lettuce, scrambled egg, and tomato make a wholesome meal. These are suggestions to which a mother will be able to add her own.

Clothing and Wraps.

Railway carriages are sometimes hard to ventilate; they are either too draughty or too stuffy. Do not allow the children to get overheated. Try to adjust their clothes to suit the time of day and the temperature. Whenever possible, take them for a walk on the platform of the stations.

Needless to say, a plentiful supply of napkins is a necessity. A mackintosh bag is a useful receptacle for wet napkins. If this is not procurable, make tight little parcels of them in several thicknesses of old newspaper. A bundle of newspapers is always handy when travelling.

A light rug and a cushion are necessary when travelling with small children.

Sleep.

It is important to provide for sleep for the little ones if overfatigue and fretfulness are to be avoided. This may be difficult if the train is crowded, but a bed may be improvised by placing a board from one seat to the next. With a cushion and a rug placed upon it this makes quite a comfortable bed for the toddler.

The Dress Basket.

A dress basket is almost indispensable when travelling with a young baby, making, as it does, a comfortable bed and a container for all the baby's clothes. Babies will require very little nursing if a dress basket is provided.

Toys and Playthings.

A few simple toys and picture books provide an interest for the child.

Conveniences.

On the long-distance trains these days ladies' compartments are provided, and these help to lighten the difficulties of travelling for the mother with children. It is wise not to allow children to use any lavatory. A circular pad made out of several thicknesses of paper makes a useful covering for the ordinary seat. If room can be found for it, a little enamel chamber is handy.

Avoidance of Sunburn.

While the children are on holiday allow them fresh air, light, and wholesome food, but avoid sun-burning, which may have serious consequences. Allow time for their skin to become accustomed to the sun. Expose them to the direct rays at first in the early morning and late afternoon only.

You may obtain information on all matters concerning child welfare by visiting the nearest Baby Clinic or by writing to the Sister in Charge, or by communicating direct with the Baby Clinic Training Centre, Alfred street, Valley, N.1, Brisbane.

IN THE FARM KITCHEN.

Choosing Fruit and Vegetables.

The importance of fruit and vegetables is being realised more and more every day, but the time has still to come when they will be taken for granted as an essential part of the everyday diet.

It is surprising to find what a number of people eat fruit only occasionally, instead of at least once a day, as they should. Men often look down on it as a regular addition to the diet with a sort of "Oh, it's all right for the kids, and looks nice on the sideboard, but I don't need it" outlook, which must be overcome if fruit is to assume the place in the diet which its value merits.

And that value is indisputable. Fruit is our best source of certain vitamins, particularly vitamins A and C. Also, its high cellulose content gives the "ballast" or "roughage" necessary in any well-balanced diet to stimulate the activity of the digestive canal. Even tiny babies can take fruit juice with advantage. Orange or tomato juice, both excellent sources of vitamin C, have been proved time and again to be a valuable addition to their diet. Fresh fruit is undoubtedly the best, but many canned fruits retain much of their vitamin content. Vitamin A withstands drying fairly well, so that fruit—such as dried apricots—may be used when fresh supplies are not available.

Hard fruits have the additional advantage of excellent cleansing properties. A piece of hard apple at the end of each meal is a dental safeguard as well as a pleasure.

Too many people make the mistake of buying only the temperate fruits—apples, pears, peaches, grapes. This may be a manifestation of the true British habit of despising our own products, or it may be due to lack of knowledge of the value of our tropical fruits. Whatever the reason, a change of view is necessary. Our Queensland fruits—pineapples, bananas, paw-paws, mangoes, custard apples, and passion fruit—are veritable storehouses of nutrient essentials, and as such deserve a prominent place in the fruit-dish.

Vegetables, both raw and cooked, are equally essential to the diet, and their value should be proclaimed from the housetops. Vegetables are necessary for three main reasons—firstly, because of their mineral salts such as lime, phosphates, iron, sodium, and iodine—most vegetables contain some or all of these salts, carrots, silver beet, peas, beans, and potatoes being particularly rich in them—secondly, because of their vitamin content. The vegetables just mentioned are rich in both vitamins and mineral salts, but *all* vegetables contain some vitamins. Thirdly, like fruit, vegetables provide roughage in the diet.

Everyone should have one serving of potatoes and at least one serving of another vegetable each day—a green or leafy one such as peas, beans, cabbage, or lettuce, or a yellow one such as carrot, pumpkin, or parsnip.

Salads are a pleasant and nutritious means of combining a number of vegetables, and it would be difficult to find anything more enticing than a crisp, daintily-arranged salad on a hot summer day. It is surprising what a number of different combinations can be devised to prevent monotony. Lettuce, tomato, cucumber, and asparagus; shredded cabbage, pineapple, and beetroot; and lettuce, potato, banana, and chopped walnuts, are a few suggestions.

In our climate many salad vegetables flourish all the year round, and it is a mistake to confine the use of them to the summer. The advantages of fresh fruit and vegetables are numerous, even in winter.

Always remember to wash vegetables carefully in running water before using them, as this will remove traces of spray and any dust that they may have gathered in their journey from the markets.

When cooking vegetables, there are four golden rules to remember if their nutritious qualities are to be preserved:—

1. Do not overcook them; quick cooking for a short period—about ten minutes—is best, as it does the least harm to the vitamins.
2. Use as little water as possible. Steam them if possible, but in any case cut down the water to a minimum, as it extracts the mineral salts.
3. Do not use soda—it kills some of the vitamins.
4. Use the water in which the vegetables are cooked as a base for soups, broths, &c.

The importance of fruit and vegetables may be judged by the fact that they form two of the five foundation foods—milk, meat, the dairy products, fruit and vegetables—upon which any well-balanced diet is based. So if there is a thought of economising on food-bills let biscuits and puddings be cut out rather than the fruit and vegetables, which have such an important influence on general health.

Recipe for fruit punch.

Served cold in tall glasses, fruit punch should be hailed with delight by anyone in summer weather. The requirements are—½ cup lemon juice, 1 cup orange juice, grated rind of half an orange, 1 tablespoon grated lemon rind, 1-2 cups of chopped fruit (bananas, oranges, apple, pineapple, pawpaw, passion-fruit), 1 quart of water, ¾ cup of sugar.

Cook sugar and water for three minutes, cool, and mix with the orange and lemon juice and grated rind. Add the fruit and ice.

◆

BANANAS ON THE MENU.

Banana Honeycomb.

Take 4 bananas, 1 pint hot water, 1 packet vanilla jelly crystals, cochineal.

Dissolve the jelly crystals in the hot water and leave until it is beginning to set. Peel the bananas and mash to a fine pulp, then add to the jelly and whisk all together for a few minutes. Stir in a few drops of cochineal. Turn into a wet mould to set, then turn on to a glass dish. Decorate base with slices of banana.

Banana Crescents.

Take 4 or 5 slices tinned pineapple, a few glace cherries, bananas (as required).

Peel the bananas and cut into slices. Cut the pineapple slices into halves, and place the two pieces together (one on top of the other). Put these in rather a shallow dish, and arrange slices of banana on them in the form of a crescent, making each slice overlap the previous one. Place a thick piece of banana in the centre hole of the pineapple and stick a cherry on top of it. Pour a little syrup round and serve with cream.

Chartreuse of Bananas.

Take 1½ pint packets of lemon or pineapple jelly crystals, ½ gill sherry, 5½ gills hot water, 4 or 5 bananas.

Dissolve the crystals in hot water according to directions on the packet; when cold, stir in the sherry. Rinse a plain mould with water, pour a little jelly in the bottom and leave to set, then decorate with pieces of banana (dipped in jelly). When set, cover with jelly to about a depth of half an inch, and when this is set cover with jelly and set again. Now add sliced bananas (also dipped in jelly), place them all over in rings, and let each slice overlap the previous one. When set, cover with jelly to the depth of half an inch, and when this is set proceed in the same way until the mould is full. When quite firm, dip in warm water, turn on to a dish, and serve with cream.

Note: Put a little of the jelly aside and use for dipping the bananas in.

Banana Russe.

Take 2 tablespoonfuls chopped banana, 2 egg-yolks, ½ pint milk, ½ oz. gelatine, ½ gill water, 3 tablespoonfuls sherry, 4 sponge-fingers, 4 whole bananas, whipped cream and cherries to decorate, sugar.

Make a custard with the egg-yolks and the half-pint of milk. Add sugar to taste. Mix in chopped bananas, the sherry, and gelatine dissolved in the water. When beginning to stiffen, pour into a buttered mould lined with split bananas and sponge-fingers. When set, turn out and decorate with cream and crystallised cherries.

Banana and Marmalade Pudding.

Take 3 bananas, 1 gill milk, 2 oz. flour, 4 oz. suet, 2 eggs, 8 oz. breadcrumbs, 2 oz. castor sugar, 2 oz. marmalade, custard to serve.

Mix the shredded suet thoroughly with the flour. Add breadcrumbs and sugar. Stir milk and eggs into marmalade. Beat well, then add sliced bananas. Mix well together. Grease a pudding basin and fill with the mixture. Cover with greased paper and steam for one and a-half hours. Serve with custard sauce.

Baked Banana Custard.

Take 2 bananas, grated rind ½ lemon, 1 level tablespoonful custard powder, ½ pint milk, 1 oz. castor sugar, 1 cupful stale breadcrumbs, grated nutmeg, grated rind ½ orange.

Well butter a pie-dish. Line it with bread-crumbs. Arrange thin slices of banana on top and sprinkle with a little grated lemon and orange rind. Cover with another layer of breadcrumbs, banana (sliced), and rinds, then top with breadcrumbs and sliced banana. Make a custard milk, powder, and sugar. Pour over the pudding, sprinkle with a little grated nutmeg, and bake in a moderate oven for about forty minutes.

Banana Border.

Take 3 sponge-cakes, ¾ pint packet pineapple jelly crystals, ¾ pint hot water, 2 or 3 bananas, 1 oz. almonds, cochineal, ¼ pint cream, sugar, vanilla flavouring.

Dissolve jelly crystals in hot water and leave till cold. Crumble the sponge-cakes. Blanch and cut the almonds. Add both these ingredients to the jelly and colour with a few drops of cochineal. When it is almost beginning to set, stir it up and turn into a wet border mould. When quite set, turn out carefully. Peel and slice the bananas and arrange round the border; put a few pieces in the cèntre hole. Whisk cream until it stiffens, sweeten and flavour to taste, and pile in the centre.

Banana Bulbs.

Take 1 round flat sponge-cake, ½ pint packet cherry jelly, 1 gill hot water, bananas as required, 1 gill milk, chocolate hundreds and thousands.

Put the sponge-cake in a dish; choose one only a little larger than the sponge. Cut small rounds out all over it, using a cutter about the same size as the banana. Cut the ends off some bananas and arrange one in each hole, the point end upwards. Dissolve the jelly in the hot water, and, when cold, stir in milk and pour over the sponge. Leave to set, then sprinkle the sponge with chocolate hundreds and thousands.

Banana Globe.

Take 4 oz. rice, 4 bananas, vanilla flavouring, 1 tablespoonful castor sugar, ¼ packet lemon jelly crystals, ¼ pint hot water, 1 pint milk, 1 oz. butter, angelica.

Wash the rice, put it into a saucepan with the butter and milk, and cook very gently until tender and until all the milk is absorbed and the mixture very stiff, keeping it stirred very frequently. When ready, stir in sugar and a few drops of vanilla. Turn the rice into a pudding cloth and tie in a round ball, then hang up and leave until next day, when it will be quite firm. Dissolve the jelly crystals in hot water and leave until almost begining to set. Peel and slice the bananas thinly. Remove the pudding-cloth and stand the rice in a shallow dish (if liked, put an upturned saucer in the dish and stand it on that).

Banana Trifle.

Take 6 bananas, 1 lemon, 4 sponge-cakes, ¼ lb. strawberry jam, ½ pint thick custard, 1 wineglassful sherry, ¼ pint cream, 1 tablespoonful castor sugar, ½ teaspoonful vanilla essence, glace cherries, angelica.

Split open the sponge-cakes, cut in half lengthways, spread with jam, and arrange in a deep trifle dish. Soak them with sherry. Peel the bananas, cut them in slices, and soak them in strained juice of the lemon. Arrange them on top of the sponge-cakes, and pile high in the middle. Pour over the custard and allow time for it to soak in. Decorate with whipped cream, glace cherries, and sprigs of angelica. Serve very cold.

Banana Pudding.

Take 4 large bananas, juice and grated peel, ½ lemon, 1 tablespoonful castor sugar, 2 eggs, cake-crumbs.

Mash the bananas smoothly, add the sugar, lemon rind and juice, and the well-beaten egg-yolks. Whip the egg-whites to a stiff froth, and fold in gently. Well butter a pie-dish and strew with sifted cake-crumbs. Pour the mixture over, stand in a tin of cold water, and bake in a moderate oven till set.

Banana Cream Mould.

Take 1 cupful banana pulp, 1 cupful milk, 3 dessertspoonfuls gelatine, 1 cupful icing sugar, 1 gill whipped cream.

Dissolve gelatine in a little hot water. Stir in sugar and scalded milk. Cool. Stir in banana pulp and most of the whipped cream. Pour into a wet mould. When set, turn out and decorate with remaining whipped cream.

Banana Blanc Mange.

Take 1½ pints milk, 1¾ oz. cornflour, 1 lemon (rind only), 1 tablespoonful sugar, 3 bananas.

Mix the cornflour to a smooth paste with some of the milk. Put the remainder into a saucepan, add the grated lemon rind and sugar. When hot, stir on to the cornflour. Return to the saucepan and bring to the boil, keeping it well stirred, then boil gently for a few minutes. Draw aside, stir in the sliced bananas, and pour into a wet mould. When set, turn out carefully.

Banana Grapefruit.

Take 2 grapefruit, 4 bananas, desiccated coconut, castor sugar, glace cherries.

Peel the bananas and mash to a pulp. Cut the grapefruit into halves (across the sections), remove the centre pith and pips. Then loosen the fruit from the rind and pith by cutting it all round the edge. Now cut between each section. Turn all the grapefruit pulp and juice into a bowl (but not the skin), and mash up; then mix the banana pulp and dredge with castor sugar. Remove the remaining skin from inside grapefruit rinds, then serve the prepared pulp in the latter, and sprinkle with a little desiccated coconut. Arrange a glace cherry in centre.

AN IDEA WAS BORN.

Most people have heard of the Kingsley Fairbridge Farm Schools in Western Australia, New South Wales, and Vancouver Island (British Columbia). And the great majority of them think the schools were founded out of sympathy for the children of the slums of Britain. That is a mistake. Sympathy there certainly was, but Mr. Fairbridge, who was a South African, had the instincts of an Empire builder, and his first objective was to provide farmers and farm workers for Rhodesia. He loved the life of the veldt and the mountains; he wanted others to know and love it, too. He went to England to study the situation. Farming is supposed to be easy, he reflected, but after long and deep consideration he decided (he was a Rhodes scholar at Oxford) that "by the side of modern agriculture, the practice of medicine was child's play." And then his great idea was born. Train the children to be farmers. Not in England, but in the lands where they will farm. And the dreamer said: "I saw great colleges of agriculture springing up in every man-hungry corner of the Empire. I saw little children shedding the bondage of bitter circumstances, and stretching their legs and minds amid the thousand interests of the farm. I saw waste turned to providence, the waste of unneeded humanity converted to the husbandry of unpeopled acres." While he earnestly sought to benefit the children, the benefit to the Dominions was the objective that Fairbridge had most at heart.

. . . Perhaps child immigration, and financial assistance, might be obtained from the Fairbridge organisation; but would it not be better for New Zealand (and Australia) to train its own orphan children and equip them so that they may become future farmers? "As the twig is bent, the tree's inclined," and if these children were "brought up on the land," and had their ambitions directed towards farming as the most desirable avocation, they would most likely stay on it. Our orphanhood statistics show that there is an abundance of material at hand. Mr. Fairbridge has pointed the way, and if the lessons his institutions have learned were availed of, substantial benefits might be conferred upon the children, and the Dominions.—*The New Zealand Farmer.*

We have received a number of Order Forms for this Journal from which the names of the senders have been omitted. Until the senders supply their names the Journel cannot, of course, be despatched.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF NOVEMBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING 1938 AND 1937, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Nov.	No. of years' records.	Nov., 1938.	Nov., 1937.
North Coast.	In.		In.	In.
Atherton	2·47	37	6·82	6·38
Cairns	3·87	56	3·54	2·42
Cardwell	4·17	66	3·52	4·34
Cooktown ..	2·50	62	2·10	1·27
Herberton ..	2·60	52	5·12	3·81
Ingham	3·80	46	5·69	3·52
Innisfail	6·37	57	6·02	13·66
Mossman Mill ..	4·49	25	6·28	7·90
Townsville ..	1·89	67	2·87	1·93
Central Coast.				
Ayr	1·79	51	0·19	4·28
Bowen	1·26	67	0·69	0·75
Charters Towers ..	1·45	56	1·73	2·45
Mackay P.O. ..	3·10	67	2·71	4·33
Mackay Sugar Experiment Station	2·79	41	5·30	2·35
Proserpine ..	2·90	35	3·26	4·14
St. Lawrence ..	2·40	67	2·40	2·16
South Coast.				
Biggenden ..	2·74	39	5·78	1·94
Bundaberg ..	2·69	55	5·72	1·71
Brisbane	3·80	86	4·76	7·94
Caboolture ..	3·65	51	3·08	10·81
Childers	2·74	43	5·82	1·47
Crohamhurst ..	4·50	45	4·31	11·24
Esk	3·25	51	6·34	3·63
South Coast—contd.	In.		In.	In.
Gatton College ..	2·81	39	5·97	3·34
Gayndah	2·96	67	6·13	4·08
Gympie	3·29	68	3·72	6·34
Kilkivan	2·60	59	6·66	3·60
Maryborough ..	3·22	67	4·21	3·97
Nambour	4·24	42	5·53	13·49
Nanango	2·77	56	5·57	4·62
Rockhampton ..	2·44	67	3·86	3·01
Woodford ..	3·32	51	2·85	6·26
Central Highlands.				
Clermont ..	2·00	67	6·51	1·64
Gindie	2·20	39	..	4·90
Springsure ..	2·21	69	9·19	5·19
Darling Downs.				
Dalby	2·83	68	7·76	7·58
Emu Vale ..	2·74	42	4·75	4·89
Hermitage ..	2·58	32	..	2·67
Jimbour	2·58	50	4·85	3·92
Miles	2·64	53	3·83	4·80
Stanthorpe ..	2·74	65	3·09	5·11
Toowoomba ..	3·33	66	3·91	5·02
Warwick	2·63	73	4·25	3·43
Maranoa.				
Bungeworgorai ..	2·29	24	..	0·30
Roma	2·17	64	1·18	1·78

A. S. RICHARDS, Divisional Meteorologist.

CLIMATOLOGICAL TABLE—NOVEMBER, 1938.

COMPILED FROM TELEGRAPHIC REPORTS.

Districts and Stations.	Mean Atmospheric Pressure, at 9 a.m.	Shade Temperature.						Rainfall.	
		Means.		Extremes.				Total.	Wet Days.
		Max.	Min.	Max.	Date.	Min.	Date.		
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	29·84	86	73	89	12, 25	70	4	210	10
Herberton	..	82	62	92	25	55	24	512	12
Rockhampton	29·92	87	69	98	24	64	30	386	13
Brisbane	29·97	81	66	94	23	62	4	476	13
Darling Downs.									
Dalby	29·94	84	62	97	24	56	21	776	11
Stanthorpe	..	78	55	91	24	51	7, 15, 21	309	10
Toowoomba	..	78	58	93	24	50	1	391	12
Mid-Interior.									
Georgetown	29·72	96	72	103	25, 27	66	7	330	11
Longreach	29·82	100	70	108	24, 27	62	6	83	5
Mitchell	29·88	91	65	101	24	57	30	304	6
Western.									
Burketown	29·82	95	76	103	26, 27	70	22	310	7
Boulia	29·73	99	74	107	9	62	1	16	2
Thargomindah ..	29·83	97	69	107	9	59	1	72	6

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	January, 1939.		February, 1939.		MOONRISE.	
					Jan., 1939.	Feb., 1939.
	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					p.m.	p.m.
1	5·0	6·50	5·25	6·46	1·56	3 45
2	5·1	6·50	5 26	6·46	2·55	4·42
3	5·1	6·50	5·27	6 45	4·2	5·36
4	5·2	6·51	5·27	6·45	5·4	6·27
5	5·3	6·51	5·28	6·44	6·4	7·12
6	5·3	6·51	5·29	6·43	7·0	7·55
7	5·4	6·51	5·29	6 43	7·52	8·35
8	5·5	6·52	5·30	6·42	8·29	9·16
9	5 5	6·52	5·31	6·41	9·22	10·1
10	5·6	6·52	5·32	6·40	10·3	10·43
11	5·7	6·52	5·32	6·39	10·42	11·27
12	5·8	6·51	5·33	6·38	11·21	a.m.
13	5·9	6·51	5·34	6·38	..	12·12
					a.m.	
14	5·10	6·51	5·35	6·37	12·2	1·0
15	5·11	6·51	5·35	6·37	12 44	1·52
16	5·12	6·50	5·36	6 36	1·28	2·42
17	5·13	6·50	5·37	6·35	2·14	3·33
18	5·13	6·50	5·37	6·34	3·3	4·25
19	5·14	6·50	5·38	6·33	3·55	5·16
20	5·15	6·49	5·39	6·32	4·48	6·8
21	5·16	6·49	5·39	6·31	5·38	7·0
22	5·17	6·49	5·40	6·30	6·39	7·52
23	5·18	6·49	5·41	6·29	7·22	8·46
24	5·19	6·48	5·41	6·28	8·12	9·39
25	5·19	6·48	5·42	6·27	9·8	10·35
26	5·20	6·48	5·43	6·26	9·56	11·33
						p.m.
27	5·21	6·47	5 44	6·25	10·52	12·32
28	5·22	6·47	5·45	6·24	11·46	1·30
29	5·22	6·47			..	
					p.m.	
30	5·23	6·46			12·44	
31	5·24	6·46			1·56	

Phases of the Moon, Occultations, &c.

3rd Jan.	○	Full Moon	7 30 a.m.
12th ,,	☾	Last Quarter	11 10 p.m.
20th ,,	●	New Moon	11 27 p.m.
29th ,,	☽	First Quarter	1 0 a.m.

Perigee, 6th January, at 9 p.m.
Apogee, 30th January, at 11 p.m.

On 3rd May a total eclipse of the Moon will be visible in Australia unless clouds draw a curtain over the often colourful phenomena. Of a partial eclipse only the ending will be seen in the eastern part of our great island.

On 3rd January our planet Earth reached a point in its elliptical orbit where it will be in Perihelion, nearest the Sun—nearer by more than 3,000,000 miles than at its maximum distance near our Winter Solstice.

Mercury will reach its greatest distance west of the Sun, 23 degrees, on the 3rd; but Venus, now the Morning Star, will be seen as much as 47 degrees west of the Sun on the 30th from an early morning hour until daybreak, rising 3 hours 22 minutes before the Sun on that date.

Mercury rises 3.28 a.m., 1 hour 32 minutes before the Sun, and sets at 5.8 p.m., 1 hour 42 minutes before it, on the 1st; on the 15th it rises at 3.40 a.m., 1 hour 31 minutes before the Sun, and sets at 5.28 p.m., 1 hour 23 minutes before it.

Venus rises at 2.18 a.m., 2 hours 42 minutes before the Sun, and sets at 3.36 p.m., 3 hours 14 minutes before it, on the 1st; on the 15th it rises at 2.3 a.m., 3 hours 8 minutes before the sun, and sets at 3.29 p.m., 3 hours 22 minutes before it.

Mars rises at 1.16 a.m. on the 1st and sets at 2.32 p.m.; on the 15th it rises at 12.53 a.m. and sets at 2.15 p.m.

Jupiter rises at 8.53 a.m. and sets at 9.55 p.m. on the 1st; on the 15th it rises at 7.28 a.m. and sets at 9.52 p.m.

Saturn rises at 12.1 p.m. on the 1st and sets at 11.48 a.m. on the 2nd; on the 15th it rises at 11.10 p.m. and sets at 11.2 a.m. on the 16th.

A display of most brilliant constellations will compensate for the dearth of popular phenomena in our evening sky this month. Among the great, first-magnitude stars Capella is one of the finest. It is near the northern horizon, in the large five-cornered constellation Auriga, and best seen when the V-shaped Hyades are high. Above all Jupiter will be seen wonderfully large and bright when near the western horizon.

4th Feb.	○	Full Moon	5 55 p.m.
11th ,,	☾	Last Quarter	2 12 p.m.
19th ,,	●	New Moon	6 28 p.m.
27th ,,	☽	First Quarter	1 26 p.m.

Perigee, 4th February, at 10.0 a.m.
Apogee, 17th February, at 12 noon.

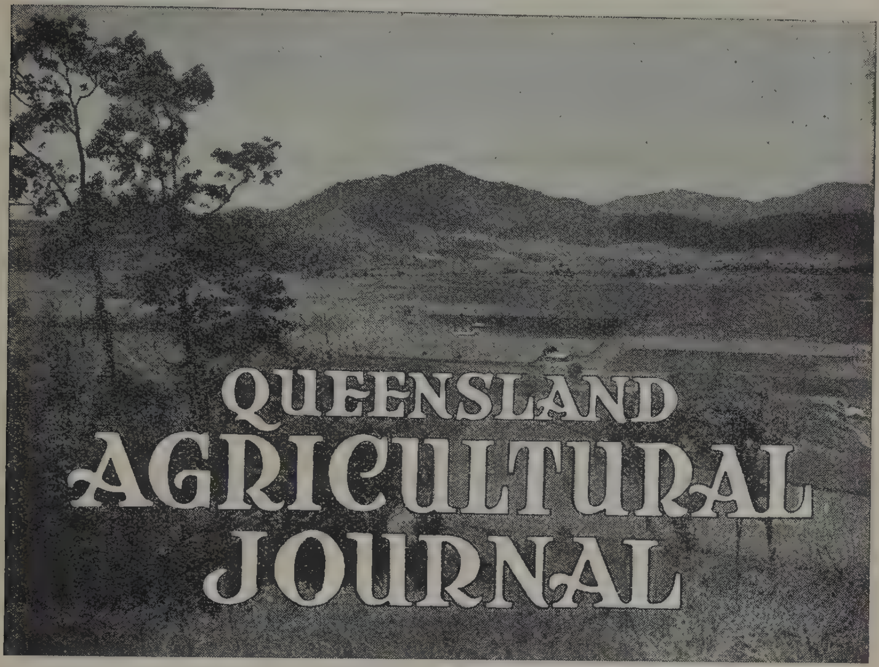
For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S. add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

ANNUAL RATES OF SUBSCRIPTION.—Farmers, Graziers, Horticulturists, and Schools of Arts, **One Shilling,** members of Agricultural Societies, **Five Shillings,** including postage. General Public, **Ten Shillings,** including postage.



QUEENSLAND AGRICULTURAL JOURNAL

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Event and Comment

The Future of the Far North.

GREAT possibilities for development in North Queensland are seen by Sir John Russell, Director of Rothamstead Agricultural Research Station, England, and he has expressed great faith in the future of this State generally. Sir John, who was one of the British delegates to the Science Congress at Canberra, toured the North recently, and, at the invitation of the Minister for Agriculture and Stock, Hon. Frank W. Bulcock, has reported on the impressions he formed in the course of his travels in tropical Queensland.

As Sir John Russell sees it, the main problems of the Far North are the proper exploitation of the rain forest, a survey of the suitability of coastal plains for culture, a search for suitable alternative crops to sugar-cane, and the possibilities of new industries.

He said in his report he was sure that there were great possibilities of development. North Australia, while tropical, differed in many respects from the tropics of India or of Africa, north of Rhodesia. In the latter places it was impossible for white men to settle and bring up families, but in North Queensland they could do so easily, and the children looked very well. They had not the pasty faces one saw in other hot countries. It was clearly possible for men of British and North European stock to run the country.

The adoption of a White Australia policy gave a special character to the Queensland tropics and raised a number of special problems. One could not transfer results obtained in other tropical countries direct to North Queensland. They would be valuable and suggestive for the experimental stage, but would only be misleading to farmers. The problem must be worked out on the spot.

The main problems which impressed Sir John Russell as urgent were:—

(1) The proper exploitation of the rain forest or scrub. This was undoubtedly a rich store of agricultural possibility, but it could easily be wasted. Close co-operation between the Lands Department, the Forestry Department, and the Agricultural Department would be needed to ensure its best utilisation. He had seen acres that had been cleared and abandoned and became a mass of lantana; others were showing distinct signs of soil erosion, which might easily become worse. Some control over clearing was, he thought, essential.

(2) A survey to show how much of the coastal plains would be suitable for seeding down to pasture land, and what parts of the adjacent hill country could be cleared of ''scrub'' for conversion into pasture, fruit, or horticulture, or other cultures.

(3) Continued search for improved varieties of sugar-cane, of maize and other local crops, also for suitable leguminous plants as fodder or green manure crops; fertilizer and management investigations regarding these crops.

(4) Investigation in pasture management, including destructive pests.

(5) Studies of crops not yet widely grown which might, however, become important as other changes occurred. There seemed, for example, possibilities of establishing a fruitgrowing industry as transport developed. Certain fibres, such as ramie, might also be grown, and special crops such as insecticidal plants.

The search for improved varieties of cane, maize, and other crops was already in hand on lines that appeared to be quite sound.

The question now arose: How were these problems best tackled? Sir John Russell's report continued.

In his view the ideal procedure, if it were possible, would be to establish an Institute of Tropical Agriculture in North Queensland on the lines of the Waite Institute, at Adelaide, and to take steps to obtain close co-operation between the two institutions. The independence thus obtained would enable the staff to get better results more quickly than in any other way.

The Tully scheme arose out of an observation by Mr. Brice Henry that his cattle preferred *Panicum muticum* to other grasses available. A group of well-chosen men, working at an experimental station and radiating their activities out over the whole tropical area, would, he felt sure, accomplish a great deal for the development of North Queensland.

Referring to the Tully scheme, Sir John said that the pastures that he had seen were excellent, and he had seen also some very nice cattle that could produce admirable beef.

The three problems, it seemed, were: How much land in the plains and under "scrub" could be converted into pasture, how long would the pasture last, and what steps could be taken to prevent or delay deterioration; and would supplies of suitable young cattle be available?

"There are great possibilities in the North," said Sir John in conclusion. "I have great faith in the future of Queensland, and have sent one of my sons to Gatton College with a view to his settling in the State. I shall always be interested in its progress."

Agricultural Organisation in Queensland.

UNLESS careful thought is given to the economics of Agriculture by a completely representatve and deliberative body with jurisdiction throughout the State, and charged with the duty of safe-guarding those aspects of agriculture which are continually in jeopardy, primary industry cannot prosper. That dictum was the keynote of the presidential address delivered by the Minister for Agriculture and Stock, Hon. Frank W. Bulcock, at the inaugural meeting of the re-constituted Council of Agriculture. The Minister went on to say that there is now a greater need than ever for one voice on the major problems of agriculture. No one unit could speak so effectively as the Council of Agriculture on behalf of the whole organised structure of the producing industries in Queensland. The future of agriculture, he believed, was in the economic sphere more particularly, although the cultural side had, too, its own peculiar problems. After all was said and done, the Department of Agriculture and Stock was eminently competent to look after the cultural side of primary industry, but in the economic field no one could deny the fact that there were certain tendencies to-day that would have to be watched with the utmost care and the Council of Agriculture would have to be prepared to submit economic difficultes as they arose to the minutest examination. At the present time, there are questions of quotas and restrictions, about which they had not to worry in former years. Therefore, it was more than ever necessary that the producers of Queensland should be able to speak with one authoritative voice on the matters which concerned so closely their material progress and prosperity. The Council of Agriculture under its old constitution had made a valuable contribution to the welfare of the land industries. As its president and as Minister he had been able to speak on behalf of organised agriculture, as well as on behalf of the Government, and he was in a position to say that the deliberations of the old council on real national problems had produced excellent results from the farmers' point of view. The job of members of the new council was no sinecure, for the closest study and understanding of the economics of modern agriculture were required of them. By its organisation on a commodity basis and by its co-operation with the Department of Agriculture and Stock, the position of agriculture in the State would be greatly strengthened by the activities of the council. In his Department were several young men trained in the economics of marketing and the combined knowledge of the two bodies, and its application to the problems of the day must result in many substantial benefits to the producers of Queensland.

The Culture of the Grape Vine in Queensland.

F. L. JARDINE, Department of Agriculture and Stock, Stanthorpe.

IN the course of the last thirty-five years, many instructive articles relating to vine growing have been prepared by officers of the Department of Agriculture and Stock in this State, and their helpful writings dealing with all branches of viticulture, as well as their personal advice in the field to growers, has aided, to a considerable extent, in establishing this branch of primary production in Queensland.

In preparing this article, the chief objective has been to place the latest information on the subject before growers in order that they may be kept up-to-date and in line with present-day methods and ideas. By design, no attempt has been made to enter upon a very lengthy description of the various subjects dealt with, but rather has the writer endeavoured to describe briefly and lucidly the more important problems to be faced in vine growing. For older and more experienced growers, there should be something of interest in this article, whilst it is hoped that a perusal of its contents will assist the less experienced to avoid some of the pitfalls awaiting the amateur, or those about to embark upon the industry for the first time.

EARLY HISTORY OF THE GRAPE VINE.

The cultivation of the grape vine dates back to the earliest ages; fossilized grape vines, leaves and seeds, and the remains of ancient wine presses unearthed at various times disclose the antiquity of viticulture. It is claimed that winemaking was an art known to the Egyptians 5,000 to 6,000 years ago, and there is evidence of the early cultivation of the grape vine in Persia, Syria, and other Asiatic countries. The Greeks and Romans gave special attention to viticulture, even regarding the culture of the vine and its produce as being of national importance. Eventually, the vine found its way to central and western Europe.

In France, Spain, Portugal, Italy, and the southern parts of Germany, it has been, and still is, a source of great wealth and in some districts its cultivation probably exceeds that of all other primary products.

In the course of time, the vine has found its way to every country where the climate is sufficiently conducive to its cultivation. In the northern hemisphere it is grown with profit within the parallels 25 to 45 degrees, while south of the equator it is cultivated between 20 to 40 degrees.

The vine can grow to a great age and attain surprising dimensions under favourable conditions. Early writers quote vines of enormous size whose trunks were as large as a man's body; some of the vines on the Barbary Coast possessed trunks eight or nine feet in circumference, while the great doors of the Cathedral of Ravenna were made of vine-tree planks. The famous English vine growing under glass at Hampton Court Palace, is a splendid specimen of the Black Hamburg variety. It is approximately 170 years of age and continues to bear an astonishing quantity of fruit annually, its record crop being over 2,000 bunches.

The vines just alluded to are mainly of historic interest; nevertheless, they show that, with skilful treatment, the grape vine, when grown in a climate and soil congenial to its development, can attain a great age and remain highly productive.

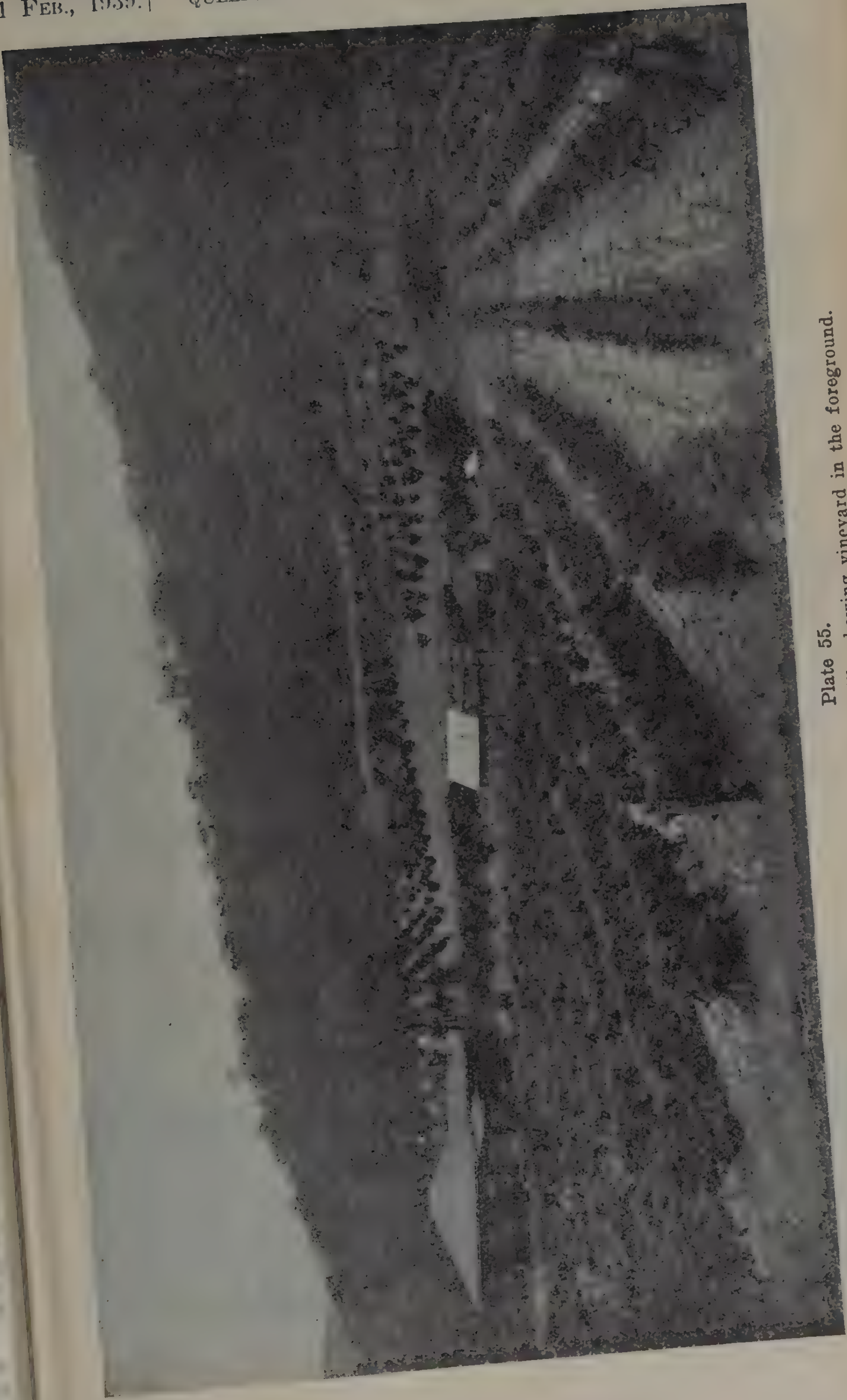


Plate 55.

A Stanthorpe orchard amongst the hills, showing vineyard in the foreground.

In Queensland, the behaviour of the average vine in the vineyard is the most important consideration, the essential point being that vineyards should be established only in those parts where the vines will thrive and become profitable. The great extent of the State, possessing as it does a wide range in temperature and rainfall, makes it imperative that anyone desiring to engage in viticulture for a livelihood seek only those areas that offer natural advantages in both temperature and rainfall or in irrigation facilities.

Although the grape vine has been cultivated in Queensland for a considerable time, the greatest progress has been made in the industry during the past twenty years. (Plates 55 and 56.) During that time, many of the established holdings have extended their acreage, whilst an influx of new growers has brought the present area under vines to quite considerable proportions. There is much good land available in partially exploited and in unexploited districts, suitable for grape-growing, that will, no doubt, be planted in the future.

GRAPE VINE SPECIES AND VARIETIES.

The grape vine belongs to the family *Vitaceæ* and to the genus *Vitis*. All the European varieties of grapes, of which there are a great many, belong to the one species, *vinifera*, and are botanically termed *Vitis vinifera*. In addition to the vinifera varieties, there are the American vines, of which there are various species, each species embracing a number of varieties.

European vines are the more important and are more universally grown than the American vines. The former include a great number of varieties suitable for every purpose, whether it be for a high-class dessert fruit, winemaking, raisin production, or for carriage over long distances, either by land or by sea.

The European varieties succeed best in the dry, inland areas, on the tablelands, and in the more temperate parts of this State. They do not as a rule flourish in the coastal and more humid areas, where they are usually attacked to such an extent by the fungous diseases peculiar to the vine as to render them unprofitable.

American vines and their fruit differ from the European varieties in many respects, apart from being less susceptible to disease. The former are readily recognised by their vigorous growth, the canes being

Plate 56.
Vineyard in winter garb.

more slender and the nodes further apart than in most European varieties; furthermore, their leaves are usually downy or felted on the under-surface, and not so deeply lobed, while the serrations or teeth are less pronounced. The fruit itself is distinct, the flesh being of a gelatinous nature, from which the skins are easily separated, while a characteristic "foxy" flavour is particularly noticeable in some varieties.

It is not intended to describe each of the species of American vines, a number of which serve no useful purpose, nor to discuss their varieties, hybrids and seedlings.

Some of the varieties of the different American species are cultivated for winemaking and for the table, and are thus direct producers of fruit; the fruit is generally considered inferior to that of the European varieties, and the wine produced from them is not of good quality. Nevertheless, they will thrive in parts of this State where the climate is unfavourable to the cultivation of the European vines.

Many American vines are phylloxera resistant, some more so than others, in that they are able to withstand the attack of the phylloxera aphid, though their fruit is rarely of commercial value. They do, however, serve a very useful purpose in providing a rooting system upon which to grow European vines, which would succumb, if grown on their own roots, in areas subject to phylloxera.

COMMERCIAL VARIETIES OF THE GRAPE VINE.

European and American grapes together embrace a great range of varieties. The climate of this State is unsuitable to many of them, whilst a great number are of little commercial value; consequently, only a limited number are recommended for planting.

Growers are advised to cultivate only those that thrive best in their district, that crop well, and have a good market value, and to avoid planting unknown varieties, except, perhaps, a few vines for trial purposes.

The following list of European varieties in order of preference is submitted for general guidance for planting in this State:—

Coast South from Rockhampton.

EARLY.	MID. SEASON.	LATE.
Madelleine Royal	Muscat Hamburg	Servant
Ferdinand de Lesseps	Black Hamburg	
Chaouch	Royal Ascot	
	Cinsaut	
	North of Rockhampton.	
Madeleine Royal	Muscat Hamburg	
Ferdinand de Lesseps	Black Hamburg	
Chaouch	Royal Ascot	
	Stanthorpe and Western Highlands.	
Chaouch	Muscat Hamburg	Waltham Cross
Canon Hall Muscat	Gros Colman	Purple Cornichon
Golden Chasselas	Red Malaga	Red Hannepot
White Wax	Cinsaut	Servant
	Royal Ascot	Flame Tokay
	Black Hamburg	Belas Blanco
	Black Prince	Dorodilla
		Gordo Blanco
		Black Malaga
		White Ladies Finger
		Red Ladies Finger
		Centennial
		Gros Guillaume
		Henab Turki

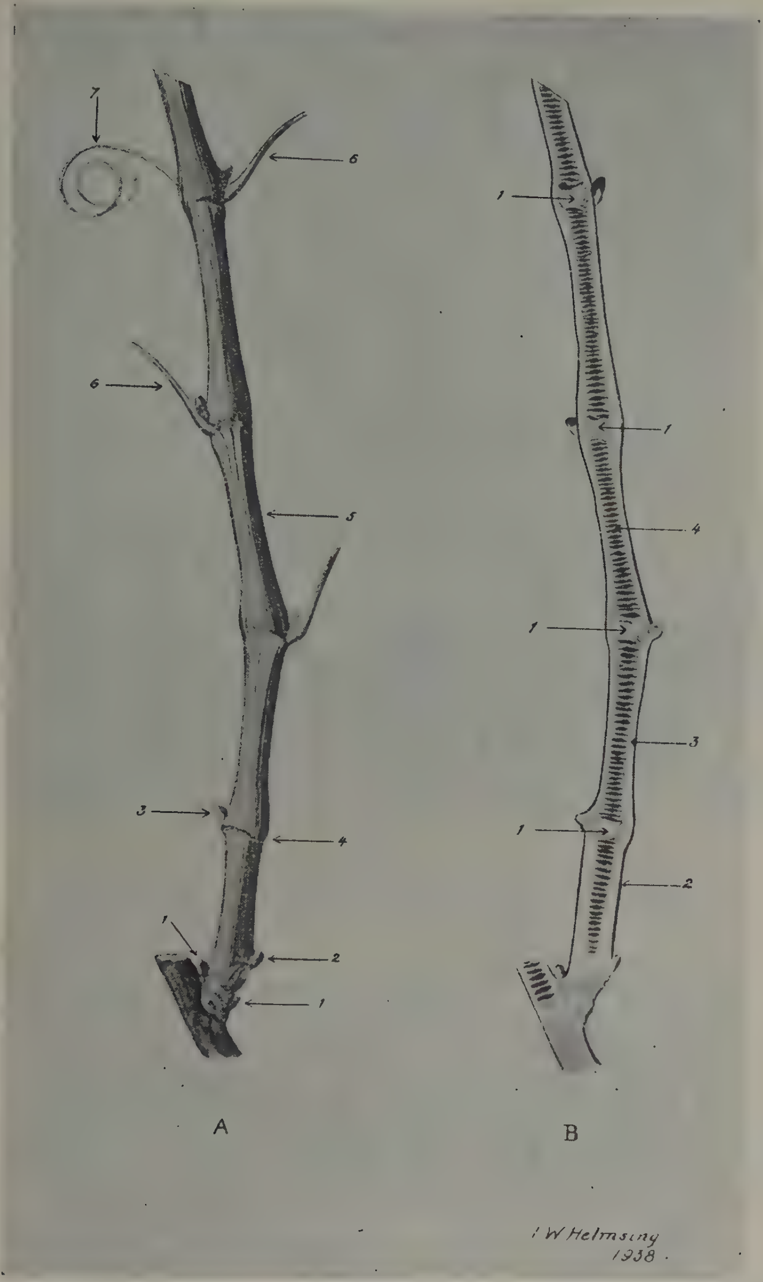
STRUCTURE OF THE GRAPE VINE.

The roots, trunks, arms, canes, leaves, flowers, and fruit together form the complete grape vine; each part has its own particular function to perform, and so closely are they allied that, unless they act in complete harmony with one another, one or more of the individual parts, if not the complete vine itself, must eventually suffer. An injury to one part of the plant can produce a serious effect upon another. For instance, should the rooting system become impaired by accident or some other cause, the growth of the canes will be greatly retarded. A premature leaf fall can have an adverse effect on the ripening of the fruit; too drastic use of the saw or secateurs at pruning time often results in an over-vigorous growth of canes at the expense of fruit, while an unnecessarily light pruning can produce weak growth, supporting an over-abundance of inferior fruit. Vines that have reached the full-bearing stage have definite duties to perform during their growing period, i.e., from the time the sap commences to rise in the spring until they become defoliated in the winter. From the time of bud burst in the spring, growth proceeds rapidly until the fruit is approaching its full size, although still green. At this stage vegetative growth practically ceases and the vine, drawing on the nutriments it has already stored up, nourishes and brings to full maturity the fruit it is bearing. From then on until leaf fall the duty of the vine is to impart the necessary reserve food it still possesses to the canes and buds until they are sufficiently mature to enable normal growth to commence again the following spring. Having completed its summer cycle, the vine sheds its leaves and remains in a dormant state until warm weather again causes the sap to rise.

The roots of the vine are of three kinds, namely, the primary or main roots which produce secondary or lateral roots, which in their turn develop tertiary roots. The growing tips of the roots are furnished with root hairs which, as the name suggests, are very fine and are of the utmost importance to the vines, because it is through them that the plant foods in solution in the soil are absorbed. The root system also serves as a foundation that supports the aerial parts of the vine against storms and wind.

The annual cane growth of the vine consists of fruit-bearing canes and water shoots. The reader will find in Plate 57, figure A, an illustration showing a length of cane with leaf stalks, buds, and tendrils. Figure B, of the same plate, shows the cane bisected to disclose the internal structure and shows the large amount of pith, constituting the core, also the formation of the nodes.

Fruit-bearing canes arise from the buds of the previous year's growth, and on them the vine produces its annual crop of fruit. Water shoots arise from the dormant buds on the older portions of the vine, and may appear on any portion above ground level. They bear little or no fruit until the second year, and this is a point that should be borne in mind when pruning. When the balance between roots and the aerial portion of the vine is upset, as may happen following too severe pruning or the death through injury of a portion of the plant, these water shoots are apt to appear. Such shoots may then be of use in providing an outlet for excessive vigour, and may, therefore, often be regarded as an indication of a healthy condition of the vine. They serve other useful purposes as, for instance, when appearing about ground level or from the trunk, they can often be utilised to reform injured or unprofitable vines. Should they arise at convenient places along the main arms they may be kept to replace overgrown or worn out spurs. If not


7
6
6
5
3
4
1
2
1
A
1
1
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2
B
I W Helmsing
1938

Plate 57.

A—1. Base bud.
2. First bud.
3. Second bud.
4. Node.
5. Internode.
6. Petiole or leaf stalk.
7. Tendril.

B—1. Hard woody divisions separating internodes.
2. Bark.
3. Wood.
4. Pith.

required for either purpose, they must be completely suppressed; otherwise they will merely rob the vine of substances that should be directed to the more important parts. The leaves of the grape vine are large and lobed; very few varieties have entire leaves, a five-lobed leaf probably being the most common type. The opening between the lobes is called the sinus. The margin of the leaf is serrated, the serrations, or teeth as they are termed, being either pointed or blunt. The stalk or petiole supporting the leaf is attached to the cane directly below a bud.

The leaves vary greatly in shape, colour, and structure, such variations being very helpful in identifying and describing varieties. The leaves are of the utmost importance to the welfare of the vine and the greatest care must be taken to ensure that they are not unduly damaged by disease or any other cause. They protect the fruit during the summer months and prevent it from being scalded. They, however, perform a much more important function because in them, with the aid of sunlight and air, certain plantfoods absorbed in solution by the roots are elaborated and changed into the form required for the successful growth of the vines and the production of fruit.

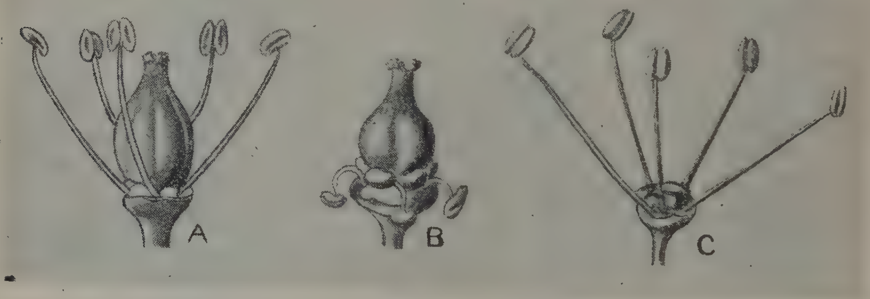


Plate 58.
A. Hermaphrodite flower. B. Female flower. C. Male flower.
(*After Babo u. Mach, Handbuch des Weinbaues*, 1923, *Paul Parey, Berlin.*)

The flowers of the vine are usually small and of a light green colour. They are grouped in clusters on the complete flower bunch which is botanically referred to as a panicle. Plate 58 (Figs. A, B, and C) illustrates three types of flowers viz., hermaphrodite, female, and male.

Hermaphrodite flowers are the more common type and are usually associated with European varieties. They are self-pollinating and are therefore capable of setting fruit without the aid of pollen from other flowers. They possess both a pistil, which represents the embryo berry, and stamens each of which has two pollen sacks attached to its extremity.

The corolla or cap which covers the flower (Plate 59) is first forced off by becoming detached at its base; from there the petals of the cap gradually curl upwards until it is finally shed. The stamens then spread themselves and later, when the sacs split open, pollen is released about the neck or opening of the pistil; from there it finds its way to the ovules, which eventually develop into the seeds of the fruit. Male flowers have no pistil, hence they are unable to set fruit. Female flowers actually have stamens but they are bent downwards, consequently the pollen is not released about the opening of the pistil. These flowers are nevertheless capable of producing fruit provided they are pollinated either by themselves or from adjacent flowers. Male and female flowers are more common amongst American vines.

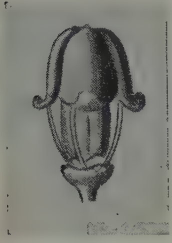


Plate 59.

Opening bud. (*After Babo u. Mach, Handbuch des Weinbaues, 1923, Paul Parey, Berlin.*)

Tendrils and bunches are closely related to each other; indeed tendrils may be regarded as inflorescences which have failed to develop into bunches of fruit. They occasionally have odd berries or a bunch of fruit attached to them; their chief object, however, is to support the annual growth by affixing themselves to adjacent objects.

Tendrils, like bunches, occur on the canes at the nodes and opposite the buds. They arise further along and towards the ends of the canes, while the bunches appear nearer the base.

CLIMATIC REQUIREMENTS.

Climate is the most important factor governing the successful culture of the vine; being a deciduous plant it requires a climate the winter of which is sufficiently long and severe to ensure a period of complete rest in a dormant state.

The grape vine is capable of withstanding many degrees of cold when it is completely defoliated; though intense cold, such as is experienced in Northern Europe, can kill vines outright. The summer should be warm and comparatively dry in order to ensure a perfect ripening of the fruit, but excessive heat may cause severe scorching of fruit and foliage, especially in those varieties whose fruit is subject to sunscald.

Vines growing in districts with a liberal summer rainfall usually suffer from diseases and the fruit is often lacking in sugar and colour.

In Queensland the grape vine can be successfully grown in many districts. The southern portion of the State is generally considered the most suitable, especially inland from the coast on the Darling Downs and on the highlands further west. The area surrounding Stanthorpe known as the Granite Belt produces a wide range of varieties, including many choice table grapes. This area is recognised as the chief grape producing centre of this State. The Roma district also grows excellent table and wine varieties. Parts of Western Queensland are capable of producing high quality berries, though in some of the dry areas irrigation is necessary. The climate of the West is favourable to the development of a high sugar content in the fruit which is highly desirable for the production of raisins. The higher altitudes of Northern Queensland grow a limited number of varieties, while some parts of Central Queensland, extending west from Rockhampton, produce some excellent grapes of the Muscat type.

The coastal districts, possessing a relatively high humidity during the summer months, are favourable to the development of diseases, while the mildness of the winter interferes with the dormancy of the vines. However, bordering the extreme southern coastline, particularly in the areas close to Brisbane, grapes are grown to some extent successfully. A limited number of varieties are cultivated, chiefly the hardier American vines, though a few of the European varieties are proving satisfactory.

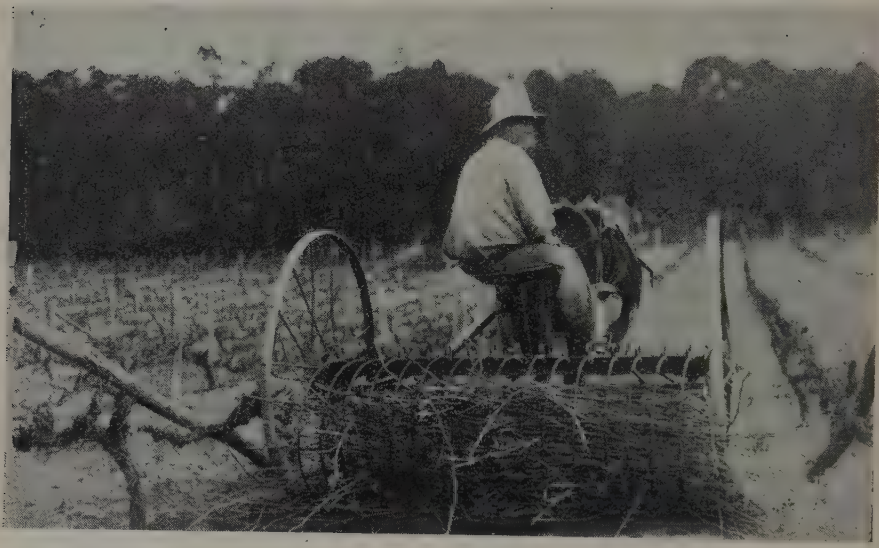


Plate 60.
An economical method of collecting prunings.

SOIL REQUIREMENTS.

The vine is a very accommodating plant, and will adapt itself to a great variety of soils. A most important feature, however, and one which is essential to the welfare of the plant is that of drainage. Grape vines will not tolerate wet situations or land that has an underlying hard pan of impervious clay holding water about the roots. Soils of this nature should be avoided at all costs, otherwise failure is almost inevitable.

Soils of a granitic nature are particularly suitable and generally speaking good, deep, loose, light to medium soils are preferable to the heavier loams. The last mentioned, in areas with a liberal rainfall, are apt to produce over-vigorous vines with little fruit; the dense foliage on such vines is very susceptible to disease and the fruit is soft and lacking in colour and sugar.

In this State, especially in the inland districts, a deep soil permits the roots of the vine to go well down to the levels containing moisture and this is of great importance to them during rainless periods. Shallow soils on the other hand require to be kept thoroughly cultivated in order to conserve soil moisture, whilst the crops should be regulated in order that the vines will not be overburdened with small fruit. Shallow soils often have the advantage of hastening the maturity of the fruit, and by thus enabling the crop to be placed on the early market enhances its value.

LOCATION OF THE VINEYARD.

The site of the vineyard is another important consideration, though it is not possible to fix any hard and fast rule that will ensure the selection of the ideal site in any part of the State. However, there are certain primary features that will serve as a guide and which must be considered when deciding upon a site for the vineyard.

The importance of well-drained land has already been mentioned as also the fact that wet and swampy situations must be avoided. Consideration must also be given to the avoidance of areas usually subject to severe hail, or late frosts, and which are exposed to strong winds.

In the cooler parts of Queensland a warm situation is necessary in order to ensure that the fruit will reach perfect maturity. A situation in such parts with a northerly, north-easterly or north-westerly slope will receive the maximum of the sun's rays. Gentle hillside slopes of this type are ideal. Where late spring frosts and high winds are to be feared timber shelters, protecting the vines from the rising sun, will help to minimise frost injury and will also serve as windbreaks.

In the warmer areas a cooler aspect is often preferable, *e.g.*, south, south-east or south-west.

The direction in which to trellis the vines is another matter for consideration, but usually the general lie of the land and the most economical method of establishing and working the vineyard decides this point. However, where the summer temperature is high, grapes are less exposed to sunburn where the rows run from east to west.

SOIL PREPARATION.

The preparation of the soil prior to planting must be thorough. In virgin soil the land must first be carefully cleared of standing timber, brush and stumps, and all roots run and brought to the surface. When these have been burnt off, stump holes should be filled in and the land levelled off when it is ready to receive the first ploughing. This having been completed, one or possibly two harrowings will be necessary when all stray roots and other debris can be gathered into heaps and burned.

A cross ploughing can now be given, the depth being regulated so that none of the subsoil is brought to the surface, after which the land should be worked down to a fine tilth by cultivation.

It is advisable to allow the land to lie fallow for some weeks before a final ploughing. This ploughing should be very thorough and at this stage subsoiling is recommended.

The method of subsoiling is as follows:—A mould-board or disc plough of the single furrow type is followed directly in the same furrow with a subsoil plough, the latter breaking up the subsoil as deeply as possible, care being taken that none of it is brought to the surface of the land. The extra expense and labour incurred in subsoiling is more than compensated for by the benefit derived by the vines. Subsoiling tends to promote a more deeply rooted plant which is better equipped to withstand the extra strain imposed upon it in dry periods, and in consequence it has a direct influence in prolonging the life of the vine. The land at this stage can be pegged out in readiness for planting.

PLANTING.

The vineyard may be established by either of two methods, namely, by planting cuttings directly into their permanent places, or by planting rooted cuttings.

The first method would appear the more simple and providing the land has been recently cleared and well-prepared it is quite satisfactory. However, if the land has previously been under crops or if grass and weeds have been allowed to seed on it, it can prove to be not only an expensive but an arduous task to keep weed growth constantly suppressed in order that the cuttings may thrive. In this class of land rooted cuttings are recommended for planting.

When planting cuttings into land that is well supplied with moisture the quickest and most simple method is with the aid of a bar. The bar is sunk to a depth sufficient to take the cutting which is then placed in the hole, with one bud about ground level and one above the ground. The bar is again inserted into the ground an inch or two from the cutting, this time at an angle, and the soil is then forced towards the cutting in such a manner as to seal it completely from the base up. The second hole made by the bar can be filled in by tramping. When planting in land that is inclined to be dry it is advisable to water the cuttings in. The cutting is placed in the hole made by the bar; the hole is then filled with water and allowed to remain until the water has soaked away. The hole can then be firmly closed by hand.

In planting cuttings it is a common practice to set two cuttings at each peg. Should both strike, one is removed and may be used to replace misses and weaklings.

If rooted cuttings are to be used for planting they should be lifted carefully from the nursery so that their roots are not damaged unnecessarily. Being extremely tender the young vines should not be exposed to the sun, but kept covered with a damp sack and planted as soon as possible. The roots should be carefully examined and any broken and damaged pieces neatly trimmed, while long roots should be shortened back and any arising about ground level completely removed.

The pruning at transplanting consists of selecting the strongest and most upright growing cane and shortening this back to two buds. The rest of the canes are cut completely away.

The young vine is planted at about the same depth as that at which it was growing in the nursery. The roots should be evenly spaced and when filling in the hole the soil must be well tramped about them. Should the land be dry water can be placed in the bottom of the hole before planting, or better still, added when the hole has been about two-thirds refilled with soil.

The distance apart at which the vines may be planted depends upon the class of soil, and the rainfall. In the dry inland areas European vines grown on the trellis system can be planted at from 5 to 8 feet apart, and usually 10 feet between the rows, whilst if grown as bush vines they should be planted on the square 6 to 8 feet apart. Where there is a good rainfall and the soil is heavier the vines can be planted more closely.

American vines are always grown on a trellis. Being stronger growers than European vines they require to be planted 10 feet to 12 feet apart in the rows.

TRELLISING.

The trellis should be well constructed with posts of durable hardwood split from matured trees; plain galvanised fencing wire will last longer than ordinary black iron wire, especially in the coastal districts where the corrosive action of the air is greater than in the inland areas.

The ordinary post and wire fence is the method usually adopted in this State for trellising vines; the wires can be either run through the posts or attached to them by a light gauge galvanised wire. The use of staples for attaching the wires to the posts is not recommended; it may appear the easiest method in the first instance, but it often entails endless attention in later years by renewing staples that become detached.

The straining posts at the end of the rows should be at least 8 inches in diameter and 2 feet 6 inches to 3 feet in the ground, leaving 4 feet above the ground; 5 x 4 ordinary trellis posts are used well rammed into the ground to a depth of 18 inches to 2 feet, and may be set approximately 18 feet apart. The straining posts must be stayed to keep them upright. The stays can be set into the ground by either backing them with heavy stones or by butting them hard up against the first trellis post 8 inches to 1 foot below the surface of the soil; the uppermost end of the stay is let into the straining post midway between the second and top wires.

The first wire is set at a height of 20 to 22 inches from the ground, and should pass through the end post to connect with a wire strainer by means of which the bottom wire may be tightened when necessary. (Plate 61.)

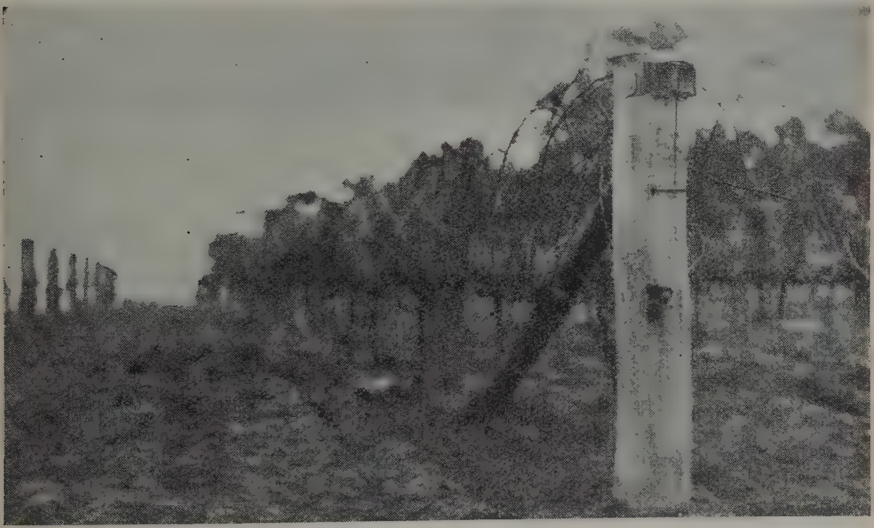


Plate 61.
An up-to-date three-wire trellis; note strainer on first wire.

The second wire is 12 inches from the bottom one and the top wire 12 inches from the second; as the middle and top two wires merely support the annual cane growth of the vines there is no need to attach them to strainers. The bottom wire, however, bears the weight of the vines and the fruit, consequently it is necessary to keep it taut in order to prevent sagging.

REPLACING MISSING VINES.

The propagation of grape vines by layering is an operation usually adopted to fill up vacant spaces in the vineyard. (Plate 62.) After the second year from planting the replacing of missing vines becomes increasingly difficult and uncertain. Those replacements made with cuttings that do survive are usually dwarfed and unprofitable. It is possible, however, to successfully replace missing vines at any age by layering.

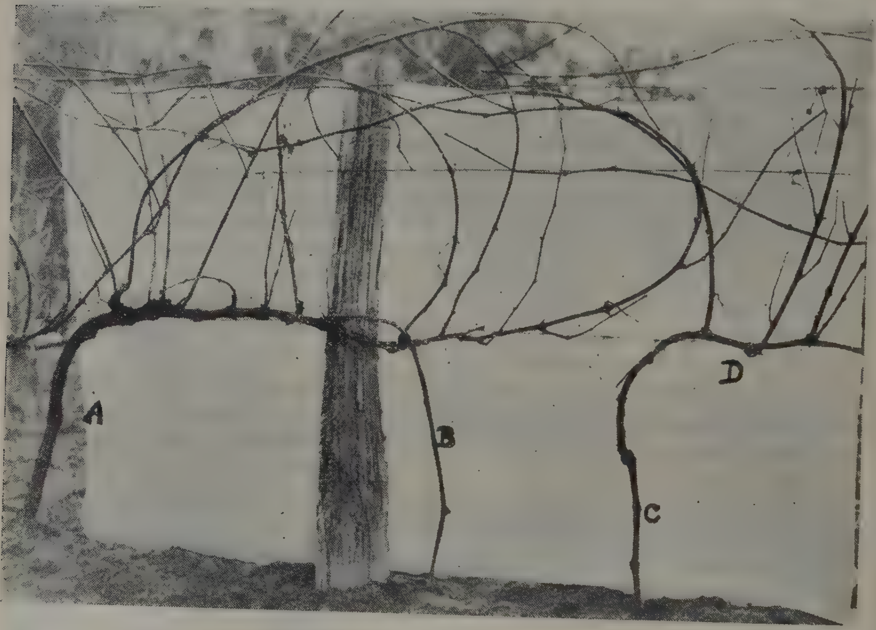


Plate 62.
Method of replacing missing vines by layering.

Layering is a simple operation, and may be carried out as shown in Plate 62. A strong cane (B) of the previous year's growth is selected from a neighbouring vine (A) and, without severing, it is bent down and buried where the new plant is to grow, in a trench 8 to 15 inches deep, according to the class of land. The extremity of the vine (C) is allowed to protrude above the surface with a sharp bend, leaving two buds out of the ground. The following summer the portion in the ground makes roots, and also is nourished by the mother vine. The end (C) puts forth growth and makes the new vine (D). The only care necessary to these layers during the growing season is to remove all growth from the cane (B) between the mother plant and where it enters the ground, leaving only that growing from the extremity of C for the new vine (D).

After the second season B is severed at ground level and the new vine may be permitted to carry a reasonable crop.

It is advisable to attend to this matter while the vines are dormant. Misses in a vineyard, apart from the unsightly appearance, are most unprofitable.

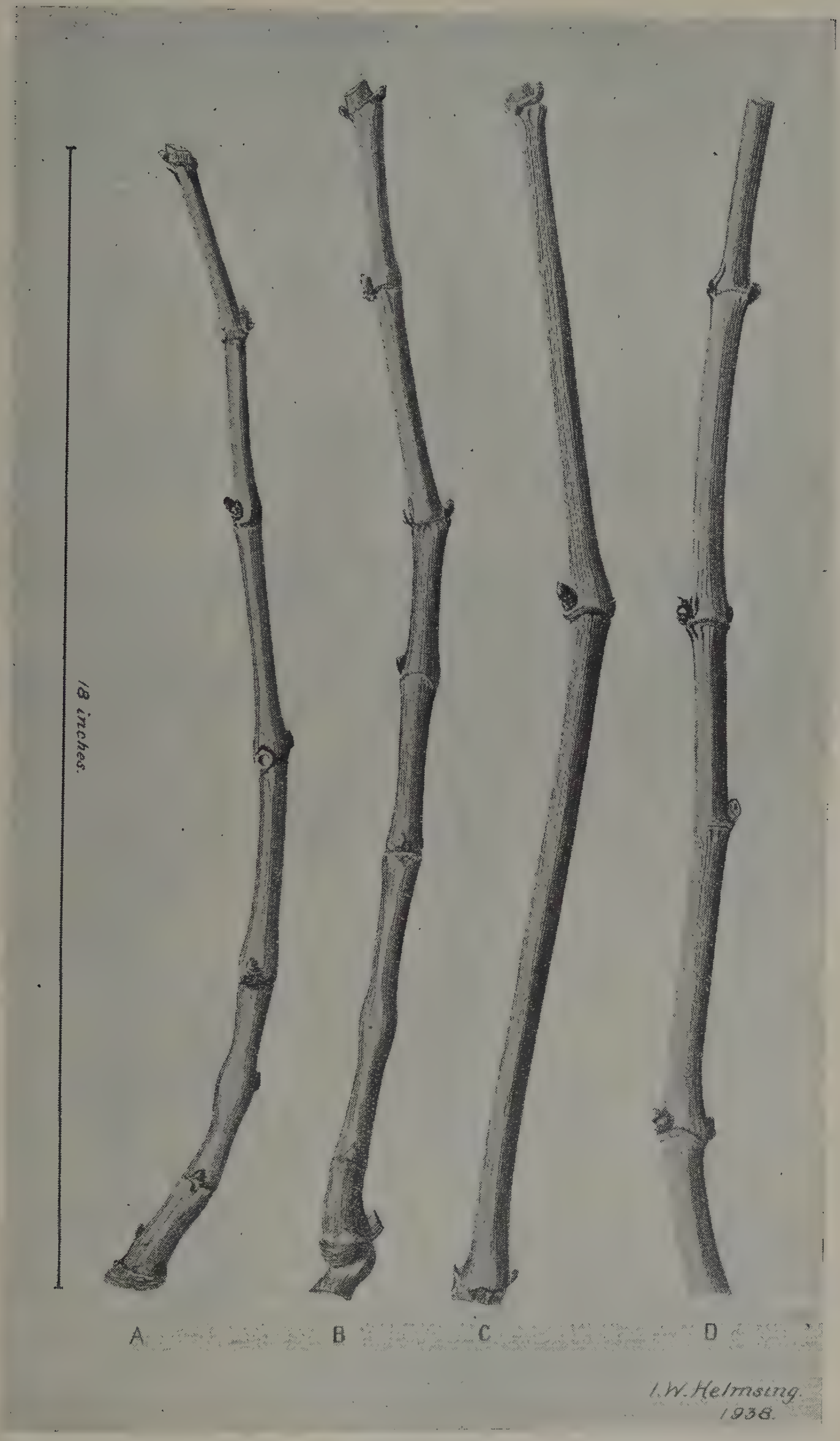

18 inches.
A
B
C
D
I.W. Helmsing.
1938.

Plate 63.
A and B. Two good types of cuttings.
C. Long-jointed cutting, undesirable.
D. Badly prepared cutting.

METHODS OF PROPAGATION.

Propagation of the vine may be achieved by the use of seeds, single eyes, layers or cuttings, though for commercial purposes it is almost solely confined to the use of cuttings. Growing from seeds is a practice best left to the plant breeder interested in raising new varieties; the single eye method entails a great deal of care and attention consequently it is seldom practised, and layering is only employed when it is necessary to replace missing vines in an established vineyard.

Cuttings are made from the canes of the previous season. The whole of the canes may be used provided they are properly matured, though the sturdiest and most reliable cuttings will be obtained from the lower portions of the canes, especially those parts adjoining the old wood. Short-jointed canes should be selected where the source of supply is large enough to permit it.

The vines from which cuttings are to be taken should be selected and tagged during the summer or autumn; only vigorous vines that are free from disease and have proved themselves to be constant croppers of good quality fruit with even-sized berries should be selected for the purpose.

Cuttings should be made as soon after pruning as possible. It is a mistake to permit prunings from which it is intended to make cuttings to lie about in the sun in the vineyard for any length of time, as the vitality of the canes is lowered by exposure.

To prepare a cutting, sever the cane with a sharp knife or secateurs directly below a node and again just above a node about 15 to 18 inches further up the cane. Clean cuts enable a callus to quickly form over the cut surface.

Four types of cuttings are illustrated on Plate 63. The first shown in Fig. A illustrates an ideal cutting selected from the lower portion of a cane and correctly prepared for planting. It will be noted that the extreme end portion of the cane containing the basal buds and dormant eyes has been retained; this type of cutting is likely to produce a strong rooting system about its base.

Another good type of cutting with a small portion of the previous year's wood attached to it is illustrated in Fig. B; before planting, however, it is advisable to remove portion of the older wood, otherwise there is a likelihood of it decaying and so damaging the basal and dormant buds.

A cutting taken from a long-jointed cane is shown in Fig. C, and although it is correctly prepared, such a cutting with long internodes should be avoided where the supply of prunings is plentiful. Where the buds are so widely spaced the roots will in consequence be unevenly set.

The fourth type of cutting is illustrated in Fig. D, which shows a cutting selected from a desirable cane, but badly prepared for planting. It should have been prepared as in Fig. C by severing the bottom end just below the bud and through the node. The long section of internode left in the ground may rot and destroy the cutting; likewise the top section should have been shortened back as in Fig. C, thus preventing it dying back, possibly past the bud.

The cuttings, having been prepared, are placed in bundles containing from fifty to sixty each, and they can be kept until required for planting by burying them horizontally with a covering of at least

6 inches of soil, or they can be heeled in on the angle leaving 3 to 4 inches showing above the ground. Cuttings will keep best if preserved in a cool, shaded sandy soil that is damp though not wet.

New land should be used for rooting the cuttings. The soil should first be broken down to a fine tilth by repeated ploughings and harrowings. When ready to plant, nursery rows may be made by ploughing deep furrows in which the cuttings are set 3, or 4 inches apart, and at an angle of 45 degrees to ground level. The furrows are then filled in and the soil well firmed, leaving two buds out of the ground, the bottom one at about ground level. If the soil is very dry the cuttings should be watered before the furrow is completely filled in.

GRAFTING.

Cuttings are best grafted in late winter, i.e., during August at Stanthorpe, about a month before they are required for planting out. Field grafting and bench grafting of young-rooted vines is performed in the spring, i.e., during September at Stanthorpe. The whip-tongue graft and the cleft graft are the two best-known methods, and these will be described.

The Whip-tongue Graft.

The whip-tongue graft is applied chiefly to young phylloxera-resistant vines and cuttings; the stock and scion, which should be of the same diameter, are spliced together in the manner shown in Plate 64.

The stock is prepared by making a clean upward sloping cut just above a node, because it is at this point that most of the knitting tissue

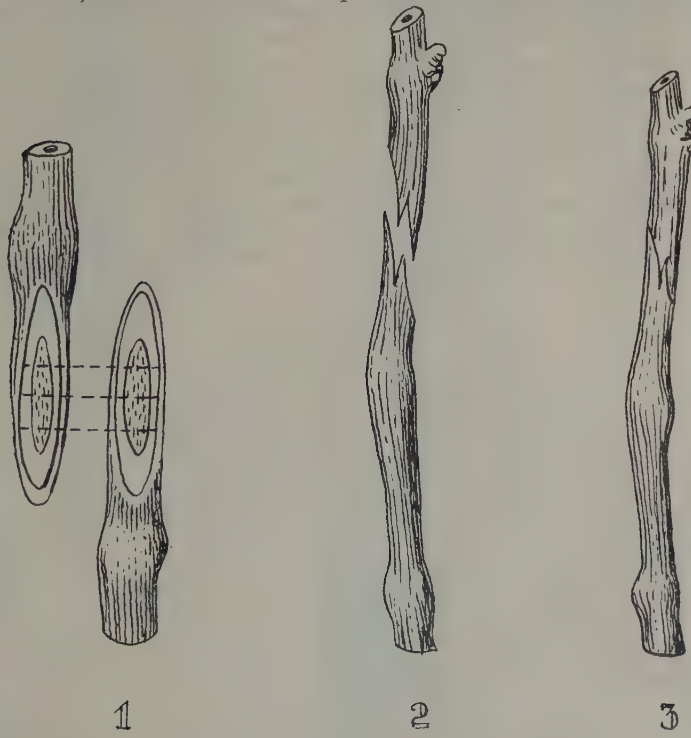


Plate 64.

WHIP-TONGUE GRAFT.

1. Section of stock and scion.
2. Preparing stock and scion with tongues opened.
3. Graft united ready for the ligature.

is formed. A correspondingly clean cut in a downward direction to the same bevel is made on the scion directly below a node. A longitudinal slit at least one-quarter of an inch in depth, following the grain of the wood, is now made in the stock and scion at about a third of the way down from the point of the cut surface; in removing the knife blade it is given a twist in order to open the slits, when the tongues thus formed can be fitted firmly into the clefts, making a perfect fit between stock and scion. The graft is now bound with raffia to hold the scion in position.

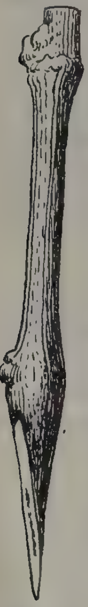


Plate 65. Scion prepared for cleft graft.

Cuttings after being grafted should be stratified by burying them horizontally in a moist sandy soil. First place a layer of grafts about 2 inches deep in the bottom of the trench and cover them with a thin layer of moist sandy soil. Now place another layer of grafts and scatter with soil, and so on until the trench is filled, when it can be covered with soil to a depth of 6 inches. At the end of the winter, when knitting tissue will have formed, the grafts can be carefully lifted and planted out with the union just below the surface. A small mound of soil one-quarter of an inch above the top bud will prevent the scion from becoming too dry.

Rooted cuttings of resistant vines can be bench-grafted after having been lifted from the nursery and prior to setting them into their permanent place in the vineyard, or they may be grafted in the vineyard if the cuttings were originally planted in their permanent position. In the case of the former the grafted vine should be planted with as little delay as possible, and immediately well mounded up with soil to cover the graft up to the top of the scion. When grafting in the vineyard, each graft should be mounded immediately after the operation. The grafts should be inspected occasionally and any suckers or scion roots carefully removed; after each inspection the grafts must be remounded, but not necessarily to the same height. The greatest care is necessary to avoid damaging or displacing any of the grafts. By the time the union is completely formed the raffia binding usually becomes

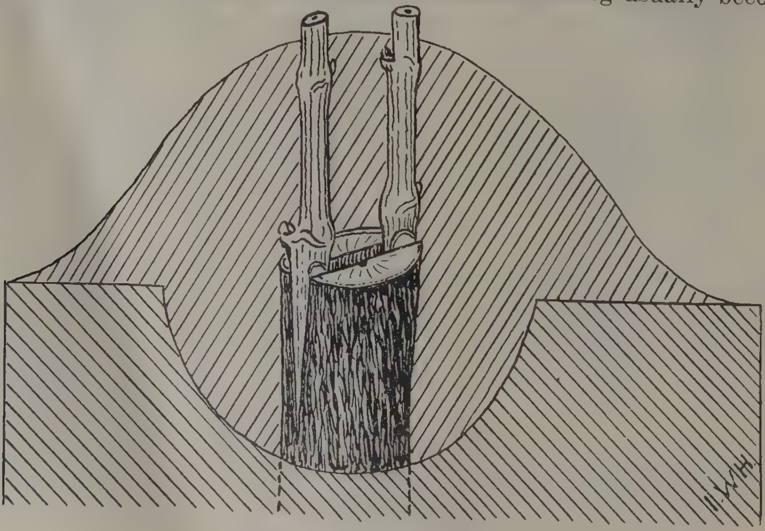


Plate 66.
Large stock fitted with scions (*after F. de Castella*).

rotten and breaks away itself. It is as well, however, to inspect a few vines occasionally to be quite sure that such is the case, otherwise the unions will become choked.

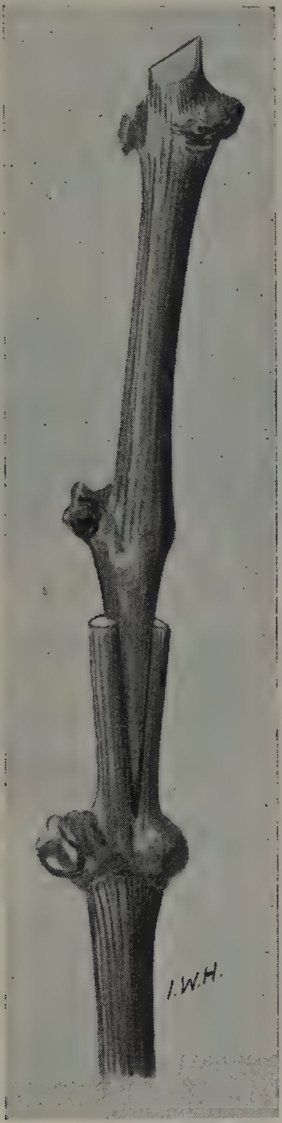


Plate 67.
Cleft-grafting, cuttings on cuttings (*after* Romeo Bragato).

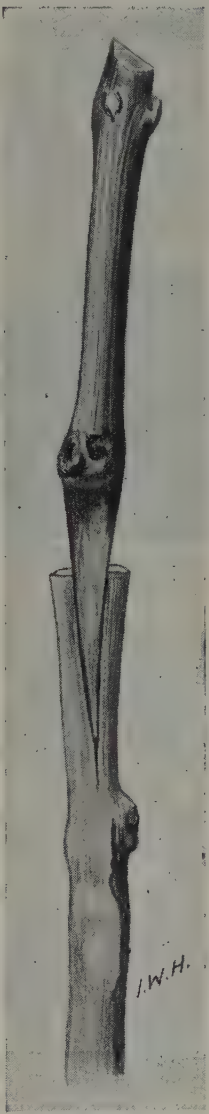


Plate 68.
Cleft - grafting on young rooted stocks (*after* Romeo Bragato).

The Cleft Graft.

The cleft graft (Plates 65, 66, 67, and 68), unlike the whip-tongue graft, can be used on stocks of varying dimensions, from cuttings up to aged vines. Vines up to eight years old graft more successfully and form more perfect unions than older plants. Aged vines with large trunks can be grafted with two scions; the results, however, are in most cases disappointing, as portion of the stock usually dies back before the grafts can cover the saw cut, and the vine is forced into an early decline. Cleft grafting is best performed in the early spring, when the sap commences to rise. The cuttings for grafting are kept in the same manner as those required for planting. The stock is prepared by sawing it off about ground level, leaving a straight section as free from knots as possible. The stock is then cleanly split with a strong knife (Plate 69) or chisel to receive the scion. The scion, which consists of two buds, is prepared to a wedge shape, commencing just below the bottom bud. The stock is now forced open and the scion neatly inserted so that the inner barks or cambium layers on each side of both stock and scion unite perfectly. The graft is then mounded up with earth to the top of the scion. It is essential that the stock be not split beyond the depth required by the scion. To avoid the split running too deeply, a ligature of fairly stout twine is first placed round the stock, the ends of the twine being retained to bind the graft after the scion has been fitted. On older vines it is unnecessary to tie the graft, for the pressure of the cleft itself is sufficient to hold the scion in position.

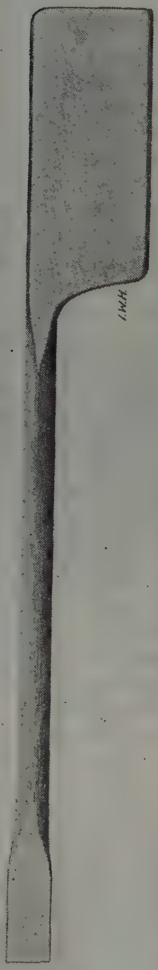


Plate 69.
A handy tool, half natural size, for cleft - grafting large vines.

Old vines when sawn off continue to exude a large quantity of sap, which is detrimental to the graft. The bleeding, as it is termed, however, can be obviated to some considerable extent by sawing the vine off a week beforehand; then at the time of grafting a further section is sawn off to the required height.

IRRIGATION.

Though it is impossible to change the climate to suit the vine, it is possible, by supplying water by means of irrigation, to grow grapes in areas where the rainfall is so limited that vine-growing would otherwise be out of the question. This particularly applies to the dry inland areas, many of which are capable of producing good grapes, provided water in sufficient quantity is available for irrigation. All water is not suitable for the purpose, and before establishing an irrigation plant it is advisable to submit samples for analysis.

Water is best applied to the vineyard by means of furrows between the rows, and should be given judiciously. Repeated applications can be harmful to vines on some of the shallow lands that are inclined to hold the water, but if given when needed most and before the vines become distressed it can be most beneficial.

Water should not be applied sparingly; the land should be thoroughly wet to a good depth and the moisture retained by systematic cultivation.

Should the land become dry after the harvest it should be watered, and again at the approach of spring if necessary. The vineyard must not be irrigated while the vines are flowering, and also, if possible, watering should be suspended at least a month before the crop is harvested. However, these are golden rules, and if the land becomes too dry and the vines are showing signs of lack of sufficient moisture, irrigation should be used as required.

CULTIVATION.

The turning over of the land by ploughing during the dormant period has the beneficial effect of aerating the soil and keeping it in a good physical condition. It helps the retention of subsequent rainfall and promotes the development of soil bacteria favourable to the plants' growth.

Shallow cultivation, usually performed during the warmer months, aids in the suppression of weeds, which draw moisture from the soil and interfere with the growth of the plant. Cultivation following a fall of rain or after the vineyard has been irrigated not only prevents the surface of the land from becoming caked, but by creating a soil mulch preserves the moisture, much of which would otherwise escape by evaporation.

Winter cultivation, performed while the vines are in a state of dormancy, should be differentiated from summer cultivation, which is performed during the period of active growth.

Plate 70.
Tractor cultivation.

Winter cultivation is best carried out with the plough in order that the soil be thoroughly turned over. It is undesirable to plough deeply as damage may be caused to the roots. Seldom is it necessary to go deeper than 6 inches, and if the surface roots have already been suppressed at planting time there should be little danger of damaging them.

One winter ploughing is usually sufficient; some growers, however, prefer to plough twice, but whether the land receives one or two ploughings it should be harrowed down to a fine tilth towards the approach of spring.

Where dry land farming is the routine method, and this is usually the case in the grape areas of this State, regular shallow summer cultivation is necessary. The reasons for cultivating during the summer have already been outlined. Usually 2 to 3 inches will suffice, but it is imperative that the surface soil be loosened after every fall of rain or where irrigation is employed after the vineyard has received a watering.

Cultivation should be avoided while vines are in bloom and setting their fruit, and at a time when late frosts are to be feared.

FERTILIZING AND MANURING.

The fertilizing and manuring of the vineyard does not always receive adequate attention. Some vineyards are consequently unprofitable owing to shortage of the various plant foods required by the vine. Fertilizing and manuring might be defined as the addition to the soil of various substances that can maintain or increase its fertility, and it therefore requires consideration by every grower.

It has been estimated that the amount of mineral food annually removed from an acre of soil in the vineyard is approximately, from 80 lb. to 90 lb. of potash, from 48 lb. to 64 lb. of nitrogen, and from 32 lb. to 40 lb. of phosphoric acid. Obviously such losses cannot go on indefinitely, and some attempt must be made to maintain the fertility of the vineyard. The variation in the readily available plant foods in different soil types makes it difficult to suggest any hard and fast fertilizer dressing for all soils. The grower must be guided largely by his own observations, but it is better to err on the safe side and apply a complete fertilizer containing the three chief plant foods, i.e., nitrogen, phosphoric acid, and potash, rather than to stint the vines. By this means the vines are at liberty to draw their nutriment according to their requirements.

Nitrogen must be used with discretion. A too-vigorous soft growth, produced by an excessively heavy application of nitrogen, is no more desirable than is a weak growth; a good average growth of canes should be the aim of the vigneron. He should, however, make sure that any lack of vigour is due to nitrogen deficiency, and not to bad drainage, overcropping, disease, or some other factor before applying nitrogenous fertilizer. In many vineyards a yearly application per acre of the following complete fertilizer is used with benefit:—1 cwt. sulphate of ammonia or nitrate of soda, 2 cwt. superphosphate, and ¾ cwt. sulphate of potash. This works out at about ½ lb. of the mixture to each vine.

Fertilizer is best applied in late winter or early spring in order to be available to the vines when they commence spring growth. It may be applied by spreading along the second and third furrows to a depth of 6 inches, or even less, and by then turning it under with the plough. On the other hand it can be broadcasted over the land, after which it is either ploughed or cultivated in.

In addition to the application of artificial fertilizers, green manuring during the winter is recommended, especially for light sandy soils. Dun field peas, lupins, golden tares, wheat, barley, and black winter rye are suitable green manure crops in the Stanthorpe district. Soils deficient in lime will benefit by periodic applications of air-slaked lime or finely ground limestone.

Unless the land is kept in a good state of tilth by cultivation, especially during the growing period of the vines, it would be unreasonable to expect highly beneficial results from the application of fertilizers or from the ploughing in of a green manure crop.

PRUNING AND TRAINING.

The vine is a natural creeper. A single plant on fertile soil may grow to a considerable size, and be composed of long slender growth which seldom produces an abundance of fruit. By pruning, the vigneron, however, produces a plant which assumes the shape more of a bush or shrub. The vitality is less than that of the wild parent, but it displays a greatly increased capacity to bear fruit. These changes are of vital importance to the pruner. A succession of heavy crops stimulated by faulty pruning can over-burden the vine to such an extent as to cause an early decline or even death, whereas judicious pruning ensures a payable crop of quality fruit, as well as an abundance of growth. To maintain this balance between fruiting and vegetative growth is of the utmost importance economically to the vigneron and to the life of the vine. It is, therefore, the art of the good pruner to get maximum crops of commercial quality fruit without impairing the health and vigour of the vine. Complete knowledge of how to prune successfully can only be gained from practical experience and a close observance of the behaviour of the different varieties.

A few of the factors on which the art of pruning depends will be useful as a guide to the beginner. They are as follows:—

A. If the vigour of a vine be diminished, its production of fruit may be increased up to a certain point.

B. A cane will produce more fruit the more it departs from a vertical position.

C. The vine shows greatest vigour at the points furthest from the root.

D. The greater the number of shoots the weaker they will be individually, and conversely the fewer the shoots, the greater is the vigour of each.

E. The more abundant the fruit on the individual vine the lower is the sugar content.

The skilled pruner can decide at a glance the necessary treatment of any individual vine. No two vines are alike. and no single method of pruning can be prescribed that will meet the requirements of every vine in the vineyard. Not only each variety but also each plant of a single variety requires individual consideration. The less vigorous vines naturally are pruned harder than their stronger growing neighbours, but as already explained the requisite knowledge of the correct degree of pruning can only be gained by experience and observation.

Vines must be pruned during the winter while they are completely dormant. They must not, however, be pruned too early in the winter, but sufficient time allowed for the canes to be completely matured. Early pruning should particularly be avoided in districts subject to late frosts, as vines pruned shortly after leaf fall are the first to commence sprouting, and the young growth is very susceptible to injury; by pruning late when the sap is rising in the vines sprouting can be delayed a fortnight, or even longer, and this delay frequently tides the vines safely over a dangerous period of late frosts. Late pruning causes vines to bleed profusely from the pruning cuts, and this is considered by some vignerons to be detrimental. Opinions, however, differ upon the subject, and the view is held that less injury is done by late pruning, and some bleeding than can be done by a late frost to the young growth on vines pruned early in the winter.

The exudation of large quantities of sap would naturally suggest a weakening of the vine, but vines that have been under observation over a period of years show no ill-effects from such loss of sap either in the fruit or growth of canes.

Two different methods are practised in making pruning cuts.

In wet climates it is customary to cut through the node exposing a hard surface, which, to some extent, prevents the entry of water and subsequent decay. (Plate 71; Fig. A.) However, in Queensland, conditions are drier, and the cut is usually made above the bud, as shown in Plate 71, Fig. 2.

The base buds, marked 1 in Plate 71, Fig. B, in many varieties of grapes do not produce fruit-bearing canes, and they are, therefore, not taken into consideration when pruning. Should the first and second buds, marked 2 and 3 in Plate 71, Fig. B, become damaged or fail to develop for any reason, the base buds are forced into growth and provide pruning wood for the following winter.

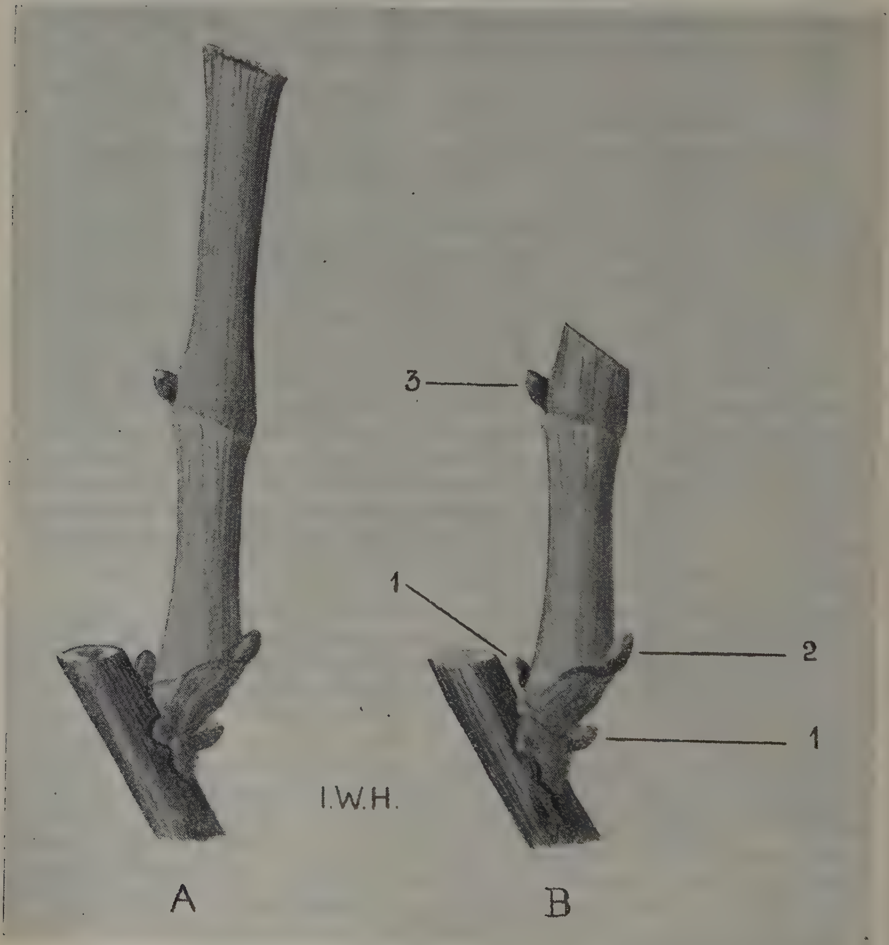


Plate 71.
Two different types of pruning cuts.

There are two methods of pruning grape vines, viz., short pruning and long pruning. Some varieties of grapes commence to bear their fruit on the canes arising from the first and second buds. They are usually termed "good croppers," and in consequence they are "short pruned" to the first two buds. The small length of cane thus left for fruit-bearing purposes is referred to as a "spur." (Plate 77.)

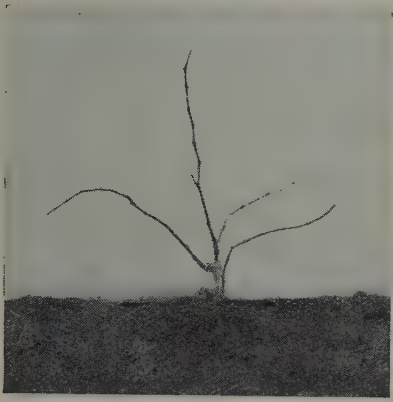


Plate 72.
A young vine before pruning.

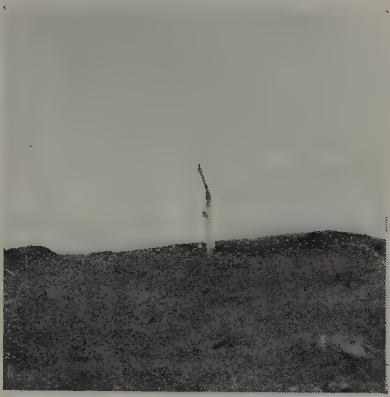


Plate 73.
The same vine as in Plate 72
after pruning.

Other varieties produce best from the canes issuing from the fourth and fifth buds and even from eyes further along the cane. Varieties of this class are long pruned by leaving a length of cane, called a rod, with six to eight buds or even more, to bear the fruit. Again some vines possess exceptional vigour and these may be pruned to bear heavier crops than less robust varieties, being long pruned to a rod of four or five buds. In long pruning it is imperative that for every rod left for fruit-bearing purposes a spur pruned to two buds be left at its base. The spur is not required for fruit but to provide renewal wood for the following year. When pruning, the rod is completely removed, the uppermost cane of the spur is shortened to a rod while the lower cane is pruned to a spur of two buds. The same procedure is repeated at the following pruning.

There are various systems of training and pruning, in short as well as in long pruning, and these are described.

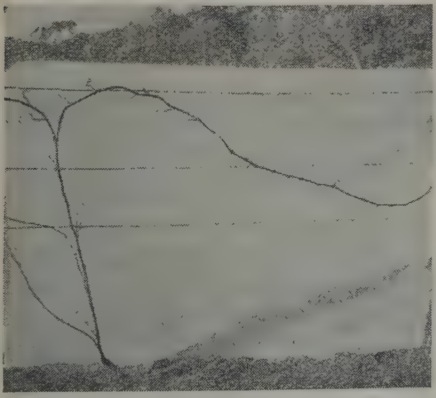


Plate 74.
A two-year-old vine before
pruning.

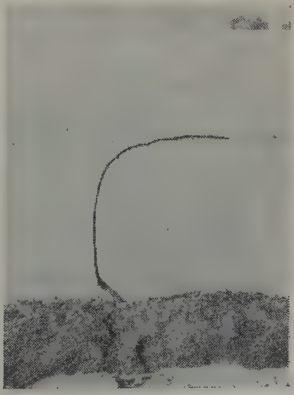


Plate 75.
The same vine as in Plate 74
after pruning.

The Royat or Unilateral Cordon Method of Short Pruning.

A young, year-old vine before pruning by the Royat or Unilateral Cordon method is shown in Plate 72, while Plate 73 shows the same vine after pruning. It will be noted that the most upright growing cane has been selected and shortened back to three buds. This main cane will form the trunk of the future vine.

A two-year-old vine before the second pruning is shown in Plate 74, while Plate 75 shows the same vine after it has been pruned and trained along the first wire. It will be observed that the cane has been given a graceful curve on to the wire. This is important in order to prevent any check to the flow of sap and to avoid splitting in later years. At the end of the cane where it is shortened back a bud is selected on the under surface. The purpose of this is to induce the new growth from this end to lie as flat as possible along the wire and not to grow upwards, as would be the case if the end bud were on the upper surface. The growth from the end bud is required to lengthen the main arm the next year.

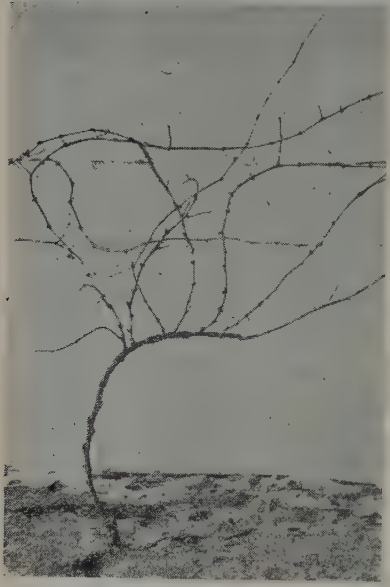


Plate 76.
A three-year-old vine before pruning.

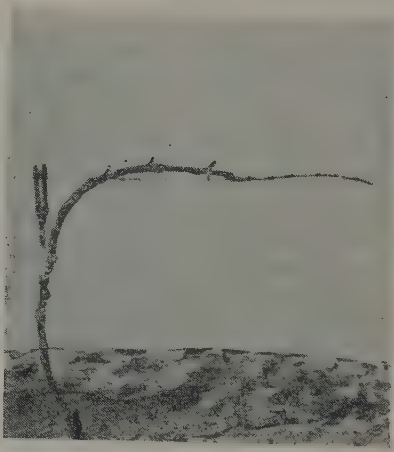


Plate 77.
The same vine as in Plate 76 after pruning, and showing the first spurs.

A vine before receiving its third pruning is illustrated in Plate 76. The pruning at this stage consists of forming the first fruit-bearing spurs by selecting canes arising along the top surface of the young main arm, and pruning them back to two buds. The spurs should be spaced about 6 inches apart, and the first spur must be situated past the curve of the neck of the vine. If it is allowed to form at the centre of the curve it will become over-vigorous and impoverish the rest of the vine. A section of the cane from the end bud is laid down along the wire with the end bud of the new section on the under surface, as in the previous pruning. Plate 77 shows the vine after pruning.

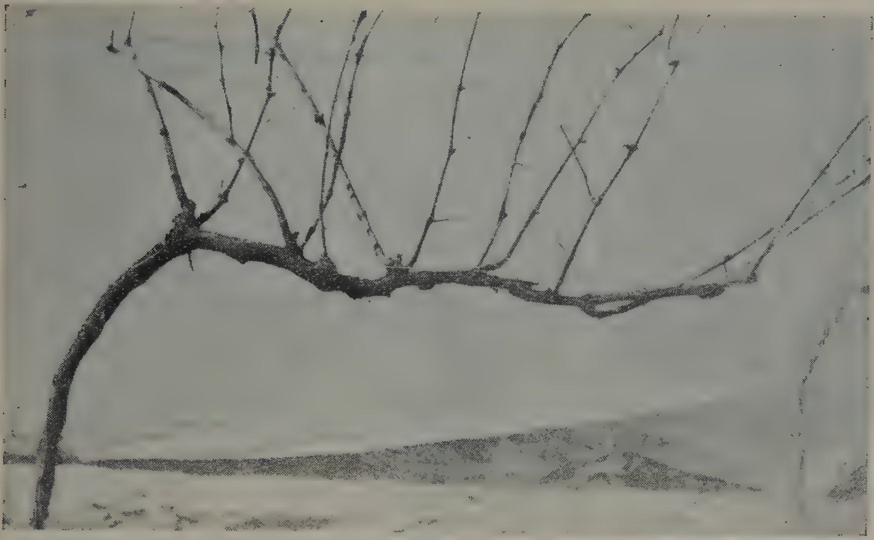


Plate 78.
A five-year-old vine before pruning.

Having formed the first spurs, the following summer two canes should be produced from each spur, i.e., one from each bud left on the spurs; at pruning the cane growing from the bottom bud of each spur, and which therefore is closest to the main arm, is selected and pruned to two buds. All other growth appearing above it is pruned off. Pruning from now on consists of treating the spurs as above mentioned, forming new spurs, as in Plate 79, and yearly laying down a section of the end cane until the vine eventually attains its full length.

When this stage is reached the last spur on the vine needs different treatment; from the two canes that appear at this point the uppermost one is pruned to several buds and tied down to meet the first spur of the adjoining vine. The lower cane is then shortened back to a spur of two buds. The following summer this spur should produce two canes, one from each bud. The next winter these two canes will be treated in the same manner as at the previous pruning.

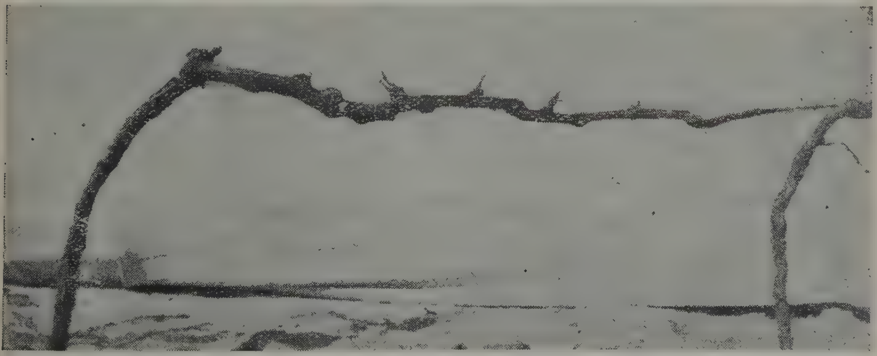


Plate 79.
The same vine as in Plate 78 after pruning.

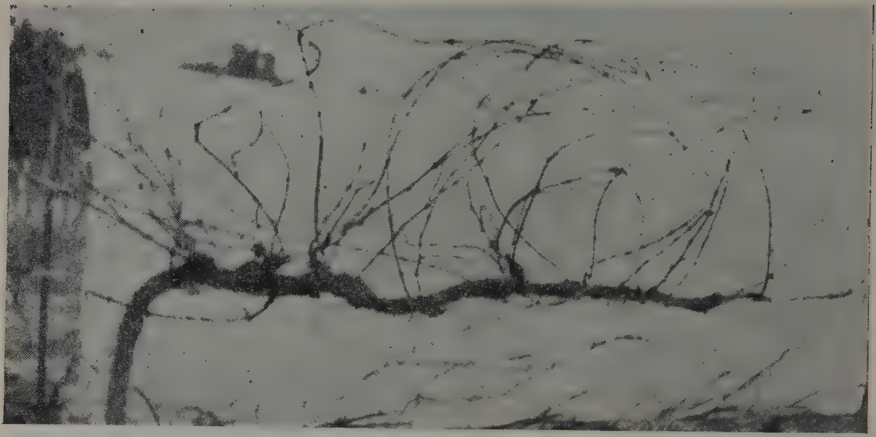


Plate 80.
A ten-year-old vine before pruning.

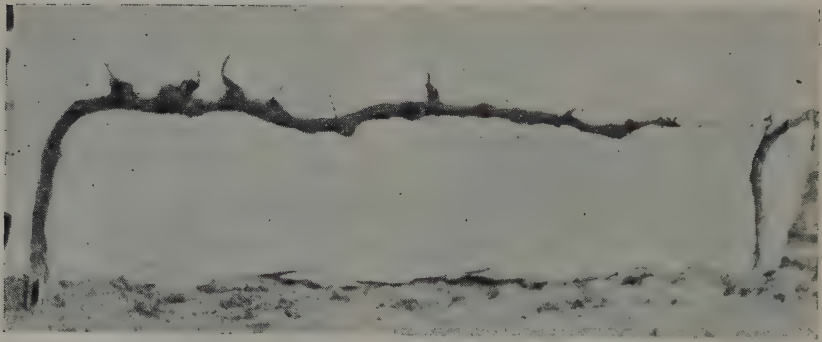


Plate 81.
The same vine as in Plate 80 after pruning.

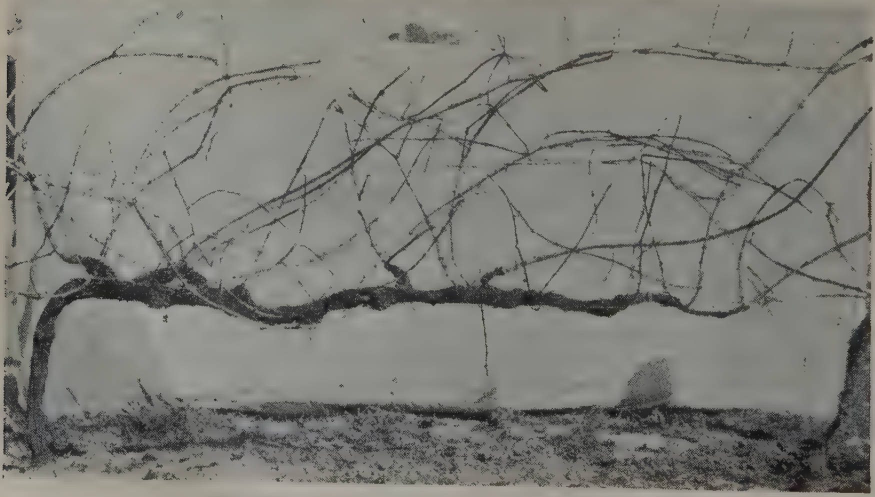


Plate 82.
The same vine as in Plate 81 four years later, before pruning.

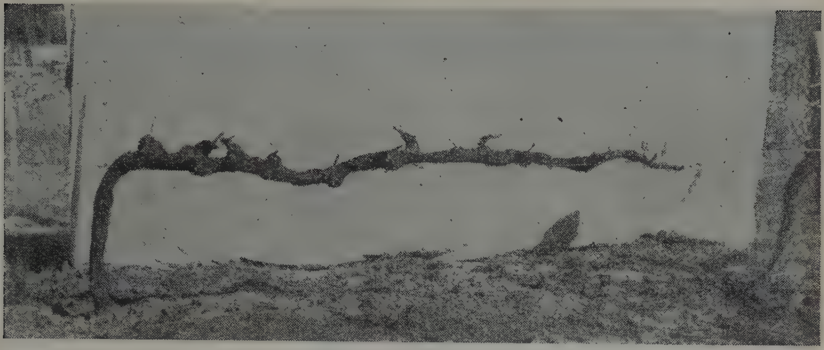


Plate 83.
The same vine as in Plate 82 after pruning; note the short spurs in comparison with those in Plate 84.

After a few years the spurs on short-pruned vines tend to become twisted and knotty and much longer than is desirable. To avoid this it is first necessary to always prune to the lower cane on the spur, as previously explained, and to preserve any water shoots appearing about the base of the spurs; these water shoots can be utilised the following year in forming fresh spurs when the old ones are removed. The spurs should be removed while they are comparatively small or before they become too large and knotty. They should never be allowed to attain such dimensions as those shown in Plate 84. To remove spurs of this type results in severe injury to the vine.

Plate 80 shows a vine before pruning at ten years of age, and Plate 81 illustrates the same vine after pruning. The illustration on Plate 82 shows the same vine four years later, and in Plate 83 it appears after having been pruned.

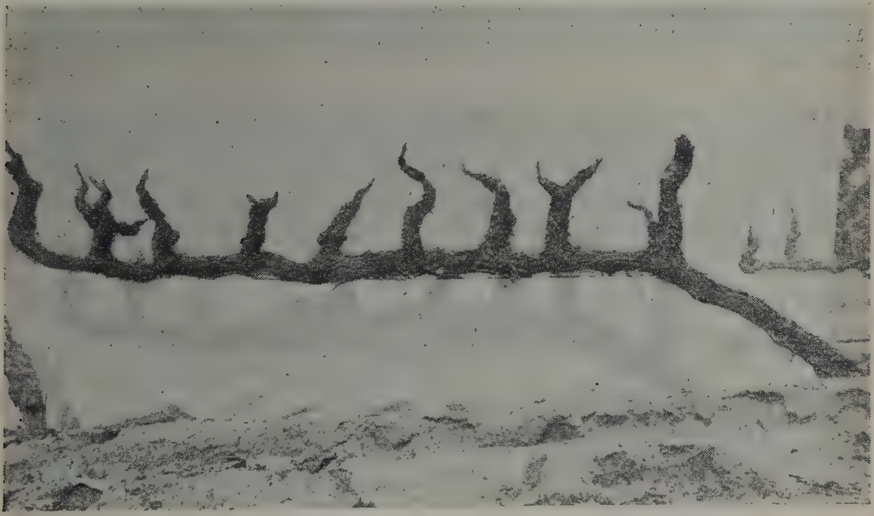


Plate 84.
A vine showing undesirable spur growth.

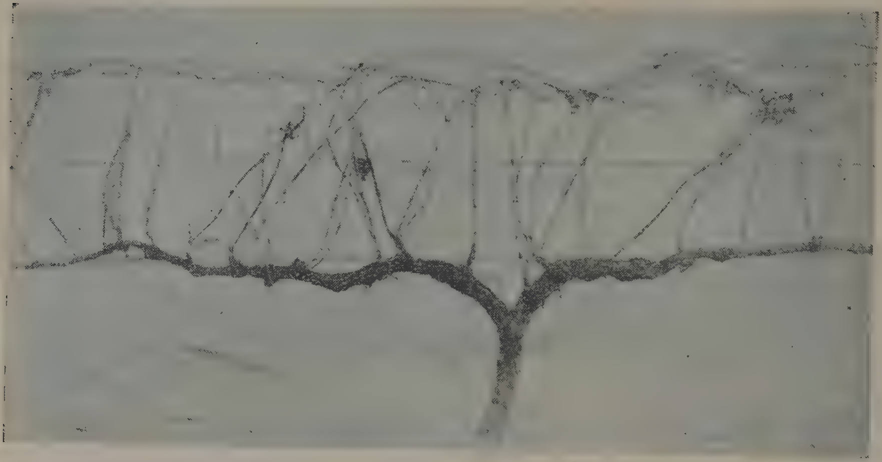


Plate 85.
Thomery Espalier.

It will be observed that the spurs on the above vine have been kept reasonably short by careful pruning, a contrast to the vine in Plate 84, which is about the same age.

Thomery Espalier or Bi-Lateral Cordon Method of Short Pruning.

The Thomery Espalier or Bi-Lateral Cordon is a two-armed vine (Plate 85). The young vine should be trained to resemble as closely as possible the letter T. The method of forming a Thomery Espalier is as follows:—

In the spring of the first year a strong, upright-growing shoot from the young plant is selected and pinched off about 4 inches below the first trellis wire; the top bud will later send out another shoot, but this shoot is again pinched back when it is a few inches long. Several shoots will appear now, but only the top one should be allowed to grow, the others being pinched back in order to encourage the growth of the top cane.

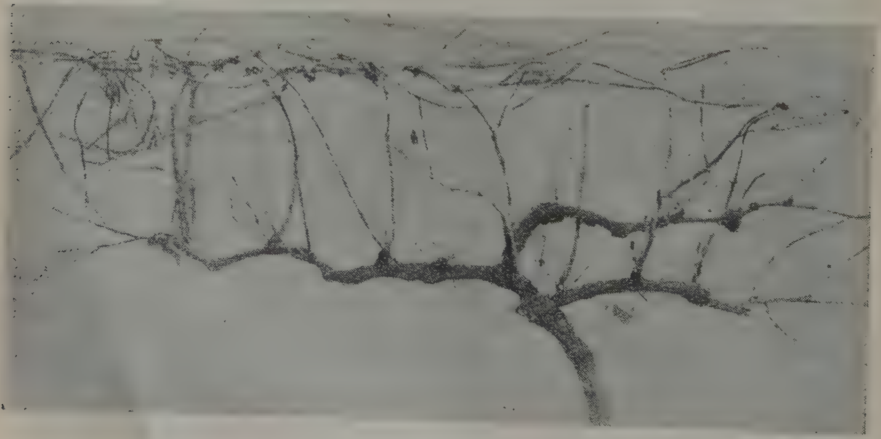


Plate 86.
A badly formed Thomery Espalier.

The following winter it will be noticed that this treatment has encouraged several buds to form close to one another on the cane just below the wire. The vine should be pruned at this point and the stem tied to the wire.

In the spring two shoots arising from about the same level can be selected and trained in opposite directions along the wire to form the main arms; all other growth should be kept suppressed. The canes arising from the two main arms are pruned to two buds as in the Royat or Unilateral Cordon method.

THE BORDELAISE ESPALIER METHOD OF LONG PRUNING.

The Bordelaise Espalier method of long pruning is suitable to strong growing and shy bearing vines, and is as follows:—A strong upright growing cane from a young vine is pruned through the node at the height of the first wire to which it is securely tied.

Several canes will now appear, and the following winter the two uppermost are shortened back to spurs, each of two buds, all other growth on the main stem being cut away.

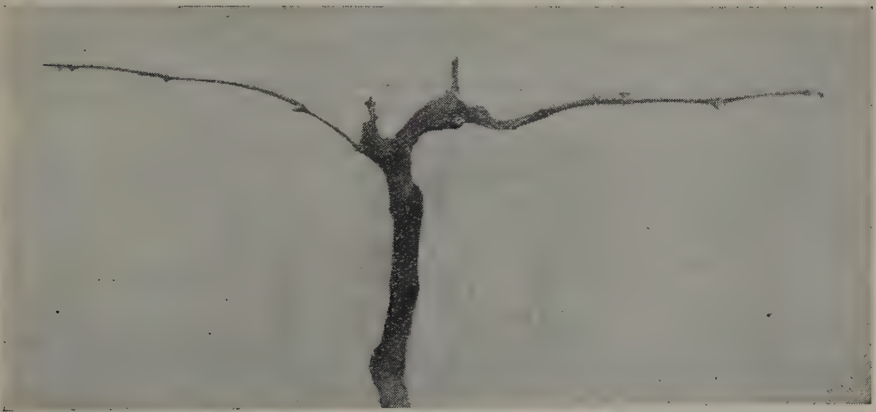


Plate 87.
Bordelaise Espalier.

By the next winter each of these spurs will have produced two canes. The top canes are pruned to short rods of four or five buds, according to the strength of the young vine, and tied down in opposite directions to each other along the bottom wire, while the lower canes are each pruned to spurs of two buds.

At the fourth pruning the rod that has borne the fruit the previous summer is completely removed, and the two canes issuing from each of the spurs are treated in the same manner as in the previous pruning.

The rods are required purely for fruit-bearing purposes, and are cut off at the following pruning. The spurs may produce fruit-bearing canes, but their chief function is to supply canes to form fruiting rods and spurs at the following pruning.

The age of the vine, its vigour, and the nature of the land on which it is growing decide the length of fruit-bearing rods it is able to support. Plate 87 illustrates a vine trained as a Bordelaise Espalier.

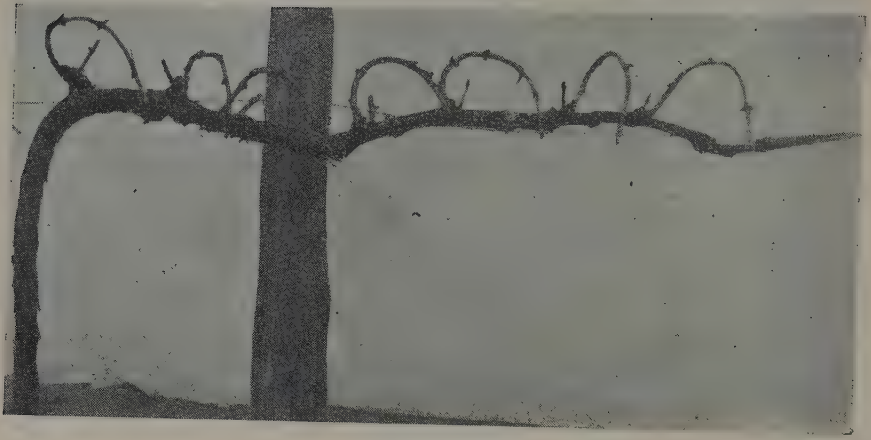


Plate 88.
Casanave Cordon.

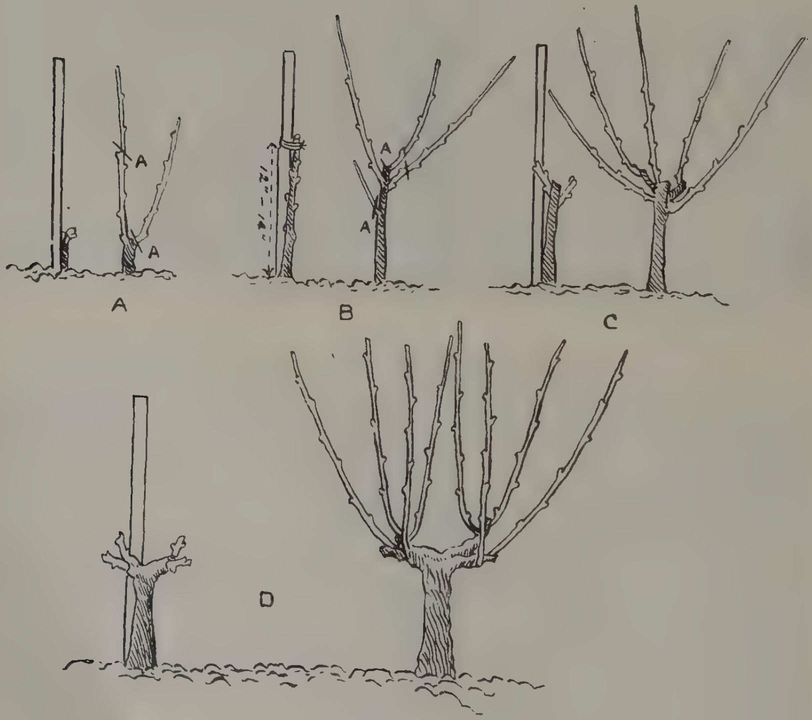


Plate 89.
Diagrammatic representation showing the formation of the bush vine.
(From Farmers' Bulletin, No. 140, Department of Agriculture, N.S.W.)

The Casanave Cordon Method of Long Pruning.

The Casanave Cordon method of long pruning, like the Bordelaise Espalier, is suitable for strong growing vines.

The young vine is trained as a Royat or Unilateral Cordon until it arrives at the stage when the main spurs are established on the vine. Plate 88 shows a vine pruned as a Casanave Cordon. It will be noticed that the uppermost cane has been pruned to a rod of five or six buds and tied down to the main arm the bottom cane being pruned to a spur of two buds. Where only one cane occurs it should be pruned to a spur.

As in the Bordelaise Espalier method the rod is retained purely for fruit-bearing purposes, and is completely removed at the following pruning. The spurs are likewise required to provide renewal wood for the following summer.

The length of the vine may vary according to its vigour.

The object of tying the rods to the main arm is to promote an even growth from each bud. If the canes were allowed to remain upright, possibly the top buds would make vigorous growth, whilst the bottom eyes remained dormant.

The Bush or Goblet System of Pruning.

The different stages in the formation of a spur pruned bush vine are illustrated in Plate 89.

It is a first essential that a stout stem or trunk be established in order that the vine may be supported against strong winds.

The illustration in Fig. A, Plate 89, shows a young vine hard pruned to two buds and the two strong canes it developed the following summer.

At the next pruning the strongest and most upright growing cane is shortened back to a height at which the head of the vine is to be formed. A long section of internode should be left above the top bud in order to tie it securely to the stake.

The height of the head of the vine varies; for wine varieties and raisin grapes grown in a hot dry district 8 to 10 inches from the ground is sufficient; for table varieties a longer stem from 12 to 16 inches is preferred.

The vine after the second pruning and the growth made the summer following in shown in Fig. B of Plate 89. At the third pruning (Plate 89; Fig. C) the first two spurs have been formed, which in turn will develop into main arms, as shown in Fig. D of Plate 89. At the fourth pruning the eight canes, as shown in the last illustration, can each be pruned to two bud spurs.

The diagrams shown in Plate 89, however, must not be taken too literally; they merely depict the various stages of training and short pruning a bush vine under ideal conditions.

The number of spurs the vine is capable of carrying will depend entirely upon its vigour and its habit of bearing fruit, and must be left to the judgment of the pruner. It is a wise procedure, though, to reduce the number of spurs if the vine is making poor growth, but where the growth is good more spurs may be allowed to remain.

Once the vine has been formed and established the pruning from then on consists of providing sufficient spurs for the annual fruiting wood, and spacing the spurs so that they will not overcrowd each other. In addition to this, any old spurs that have become knotty and elongated should be replaced by new and more vigorous growth.

As some vines do not fruit well when short pruned to spurs of two buds, it is in these cases necessary to adopt a different method of pruning and leave two or more canes of the previous years' growth from 2 to 3 feet long to bear fruit.

The Bordelaise Espalier method of pruning trellised vines can be adopted for vines trained on the Bush or Goblet method. In the case of the latter, the fruit-bearing rods instead of being tied down to the first wire are either twisted together in the form of a bow or they may be bent down and tied to the base of the opposite spur. (Plate 90.)

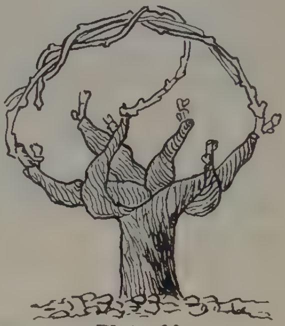


Plate 90.

Rod-pruned bush vine. (*After Fig. 13, Farmers' Bulletin, No. 140, Department of Agriculture, N.S.W.*)

Summer Pruning.

Summer pruning may be divided into three separate and distinct operations, namely, the removal of young shoots, pinching and topping.

Each spring, vines produce a number of superfluous shoots which, if allowed to remain, would greatly diminish the vigour of the vine. In the case of bearing vines showing too many fruit blossoms, as well as young vines, the suppression of young shoots is necessary to regulate the crop within reasonable limits.

Moreover, these shoots, if not summer pruned, will have to be winter pruned, and the latter operation inflicts a wound that is more difficult to heal over than the former.

The work is best executed when the shoots are about 10 to 12 inches long, when they can be easily removed under pressure of the thumb and index finger; at this stage they should be sufficiently developed to show which of them have fruit blossoms.

All water shoots issuing from the old wood, both arms and trunk, should be removed, unless they are needed to reform vines, replace spurs that have become elongated and knotty, or fill up a gap in the spurs.

In spur pruned vines of both bush and trellis type frequently two or even three shoots arise from each bud. Few vines can support such growth, especially if it is fruitful, and remain healthy. Where more than one shoot occurs the weakest should be removed, leaving only one at each node. One shoot to each spur would probably be sufficient for the less vigorous vines. Stronger growing kinds, though, may support two or more shoots on each spur.

The removal of young shoots of long pruned vines consists of removing the surplus shoots on the rods and preserving the strongest shoots on the spurs, in order that sturdy renewal wood be available for the following pruning, providing always that where necessary water shoots should be retained to replace spurs.

The operation of pinching is advantageous for two purposes; firstly, to assist the setting of the fruit, and secondly to balance the growth from the spurs. Some vines persist in setting their fruit very badly; by nipping off the extremities of the canes with the thumb nail when the blossoms begin to open, the nourishment that would otherwise be absorbed by the young growth is diverted to the flowers, and this often has a beneficial effect upon fruit setting. Should the pinching be done a week to ten days before the flowers commence to open the young shoots will have commenced fresh growth, which will only aggravate the trouble.

The extreme end buds of the spurs or fruit-bearing rods are usually the first to commence growth and absorb most of the sap, thus preventing the other buds from bursting. By pinching these shoots when they are a few inches long a check is given to their growth and the other buds are enabled to burst and make normal vegetation.

Vines that are not vigorous should not be pinched.

The pinching of the young shoots has its advantages as has already been explained; topping or lopping off more matured canes, however, is a practice which can easily be abused, with harmful effects to the vine as well as to the fruit. The idea of removing a considerable portion of cane growth so that the bunches may benefit by the sap that is forced into them is unsound, and very often the practice rather impairs the quality of the fruit than improves it.

The leaves are of the utmost importance to the vine; and they may be regarded as the seat of manufacture of certain essential substances that the vine and the fruit need. Consequently the source of supply thereof is reduced materially by an indiscriminate use of topping.

Topping should only be practised on healthy vines when the strong growth interferes with cultivation or harvesting.

The bunches are usually better developed and more attractive in appearance if allowed to ripen in the shade. However, if the foliage is too dense a few of the lower leaves may be removed, but this must be done with discretion.

Repruning After Frost Injury.

Spring frosts occasionally cause considerable damage to grape vines, especially in the inland and tableland districts. Early sprouting varieties and vines which come into leaf prematurely as a result of early pruning are naturally more susceptible to injury.

Unfortunately, one frost can destroy practically the entire crop of a vineyard; but, provided the damage occurs before the vines have made too much headway, it is possible, by skilful repruning, to produce a half crop or even two-thirds of an average crop that will ripen satisfactorily under normal conditions.

The buds of a grape vine appear to the unaided eye to occur singly on the vine, though two, three, or even four dormant buds are actually situated about the base of each obvious bud and there remain dormant. except in the event of injury, when the most forward of them is forced into growth. This first dormant bud is capable of producing sound, normal wood, and in quite a number of varieties it is fruitful.

In a few days after frost injury the damage is clearly defined, and the work of repair should be carried out as soon as possible. The damaged shoots should be removed from the vine at a point just below their first buds, but not too close to the spur, otherwise there would be a grave danger of destroying the dormant buds at the base of the shoot.

The method of repruning depends on the extent of the damage and the stage of growth of the young shoots. In the event of the shoots being frosted when they are but a few inches in length or less, they may be killed outright, and there will be no need to touch the vines, as the dormant bud will then automatically develop; if the young canes are only partly damaged by frost and sufficiently soft to snap off under pressure of the thumb, the work can be done by hand.

Should the damage occur later, when the canes have become pithy and are inclined to tear rather than snap off, the secateurs or a sharp knife should be brought into use, otherwise there is danger of destroying the basal buds.

Occasionally some shoots showing fruit have escaped injury while the rest of the vine is badly damaged. These shoots may remain, but they must be pinched back so that the dormant eyes on the frosted spurs may develop.

Repruned vines receive a severe shock and are temporarily unbalanced; when they commence their second growth they invariably shoot from most unexpected places. Water shoots will appear along the main arms and from the base of spurs. This surplus growth must be rigorously suppressed, and only the main shoots required on the spurs retained. Should this work be neglected, the vine would result in a dense mass of slender, weak canes, producing little fruiting wood for the following pruning.

Naturally, some varieties crop more freely when repruned than others. However, repruning aims not only at producing a crop of fruit but also at stimulating the development of suitable canes capable of producing a normal crop in the following year.

The Judicious Use of the Pruning Saw.

The pruning saw should be used with discretion in the vineyard, the secateurs alone being sufficient to deal with most of the work. The improper use of the pruning saw can cause very serious damage, especially on aged vines, where often an irremediable injury is inflicted that frequently brings about an early decline.

It is necessary at times, of course, to remove worn-out growth or overgrown spurs with the saw, but in most cases the saw-cut could have been avoided if the fault had been observed in the early stages and rectified then with the secateurs. In many instances the saw-cut is mistakenly made close on to the main arms, exposing a large wound which seldom heals over but gradually dies further back into the very heart of the vine. The softer tissues of a grape vine, when exposed to the weather, naturally collapse and die back much more rapidly than those of plants of a harder nature. Thus in a large wound the young callus may not be able to cover the cut.

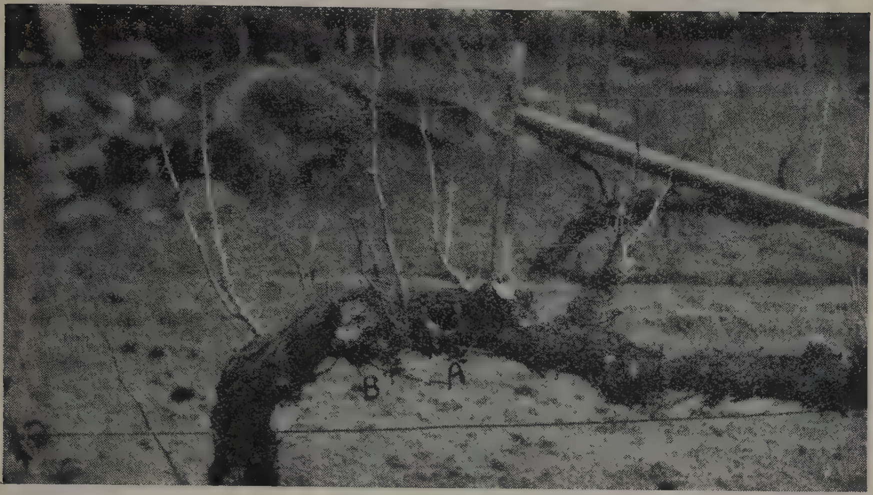


Plate 91.
Large injurious wounds made by saw-cuts too close to the main arm.

When large saw-cuts are necessary it is preferable to leave a projecting stub of about 2 inches. The following winter the dead portion of the stub can be removed, when it will be found that the surface area of live tissue exposed by the wound has been considerably reduced, and it will callus quickly. At this stage the healing process can be further expedited by protecting the wound from the weather by a good wax preparation or one of the bitumen products on the market.

Plate 92.
A fine pergola in the making, both ornamental and commercial.

The illustration in Plate 91 shows two injuries on a vine caused through wrongful saw-cuts. The deep-seated wound A has penetrated almost through the vine, while the injury B, which was made some years later, is in a less advanced stage. It will be observed that growth has practically ceased past the injury A.

OVERHEAD TRELLISING.

Strong growing varieties, preferably with large leaves, are the most suitable for garden or drive pergolas. Various systems of training vines overhead can be employed; some, however, are rather complicated and entail a lot of time and attention in order that they do not get out of control.

A simple method is as follows:—The vines may be planted 6 feet apart in the rows; the first vine is trained to a single upright stem and taken halfway across the roof of the trellis; the second vine is trained either as a Royat or Unilateral Cordon or as a Thomery Espalier or Bilateral Cordon along the bottom wire at a height of 20 or 22 inches from the ground; the third vine is taken overhead in the same manner as the first; the fourth is trained in a similar way to the second, and so on to the end of the row. The same arrangement applies to the opposite wall of the trellis.

The trellis is wired at convenient spacings along the sides and roof.

The canes that issue from the vines on the bottom wire are trained upwards on the side wires of the trellis to shelter the walls; the vines trained overhead have bare stems from the ground, the first spur being situated just past the bend on to the roof.

Short pruning is applied to vines trained overhead; however, should they show excessive vigour, the Casanave method of long pruning may be adopted.

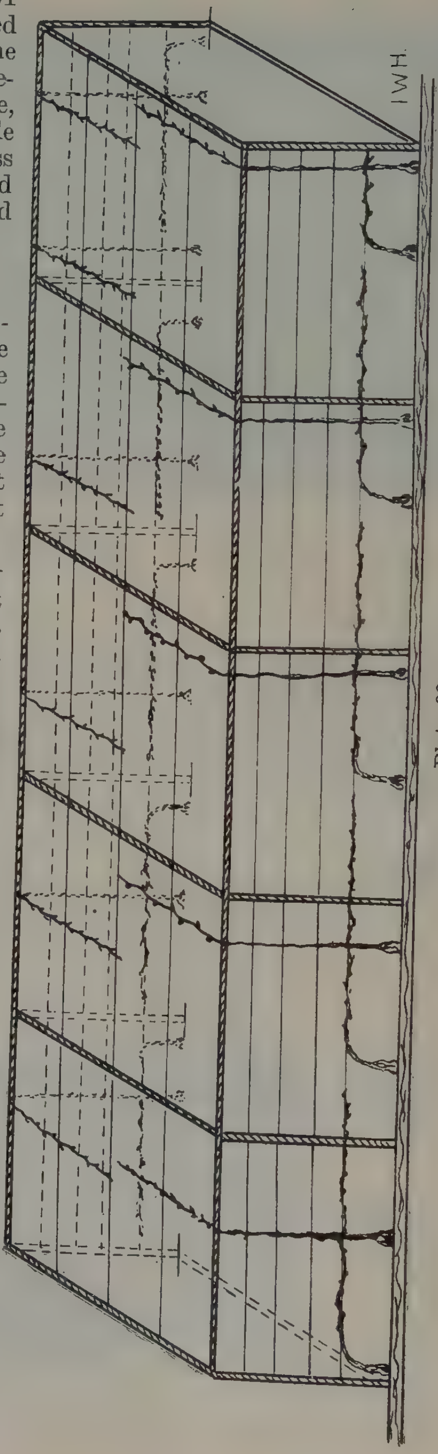


Plate 93.
Method of training overhead.

Virus Diseases of the Strawberry.

F. W. BLACKFORD, B.Sc.Agr., Assistant to Research Officer.

DURING recent years, strawberry growers in many countries have been troubled by a ''degeneration'' or ''running-out'' of certain varieties. On investigation, it was shown that virus diseases played an important part in the production of this condition. Two such virus diseases are now recognised as a major cause of losses in strawberry plantings. Both of these occur in the Southern States of Australia, where they are reported to be assuming serious proportions. Surveys made in the southern districts of Queensland have revealed that these diseases are present here also, though not, as yet, causing serious harm. It must be remembered, however, that the spread of virus diseases is insidious and their effects are seldom appreciated until the trouble is widespread and the losses are severe. It is with the object of showing how the consequences of neglect may be avoided that this article has been written. The early recognition of diseased plants and the adoption of control measures without delay should prevent the diseases becoming a serious factor in the production of the crop.

History.

The first record of a strawberry disease of a virus nature was made in California in 1922. It was later described as a ''degeneration'' disease, and was known as ''yellows.'' Still later it was renamed ''xanthosis'' to distinguish it from such well-known diseases as cabbage yellows, caused by fungal organisms. A somewhat similar disease was described from England under the name ''yellow-edge.'' Further work has shown that the American and English diseases are probably identical. The disease has since been recorded from Canada, France, New Zealand, Tasmania, and Victoria, so that it is widespread.

Another virus disease, exhibiting symptoms somewhat different from those of yellow-edge was found affecting strawberries in Oregon. This disease was given the name ''crinkle.'' It has also been recorded from Canada, England, and Victoria.

Both the abovementioned diseases occur in strawberry plantings in Queensland. Yellow-edge is more prevalent than crinkle, though in one planting the latter disease was present in a severe form in an introduced variety with the result that the plants were a total loss.

Symptoms.

Yellow-edge.—Plants affected with the virus causing yellow-edge have a sickly, pale green, stunted appearance. While the outside leaves may be more or less normal, the centre leaves are small and deformed. The leaf stalks are shortened, giving the whole plant a flat, bunched appearance. The most striking symptom, from which the disease is named, is the creamy yellow colouration extending in from the edge of the leaflets. The malformations in the centre leaves are due to the margins of the leaflets being curled or cupped upwards. Very often the whole leaflet is twisted and the margin deeply indented.

Crinkle.—Crinkle affected plants also have a dwarfed, pale green, sickly appearance. As is the case with yellow-edge, there is a shortening of the leaf stalks which gives a flat, bunched appearance to the plant. The curling of the leaves found in yellow-edge is replaced by a crinkling

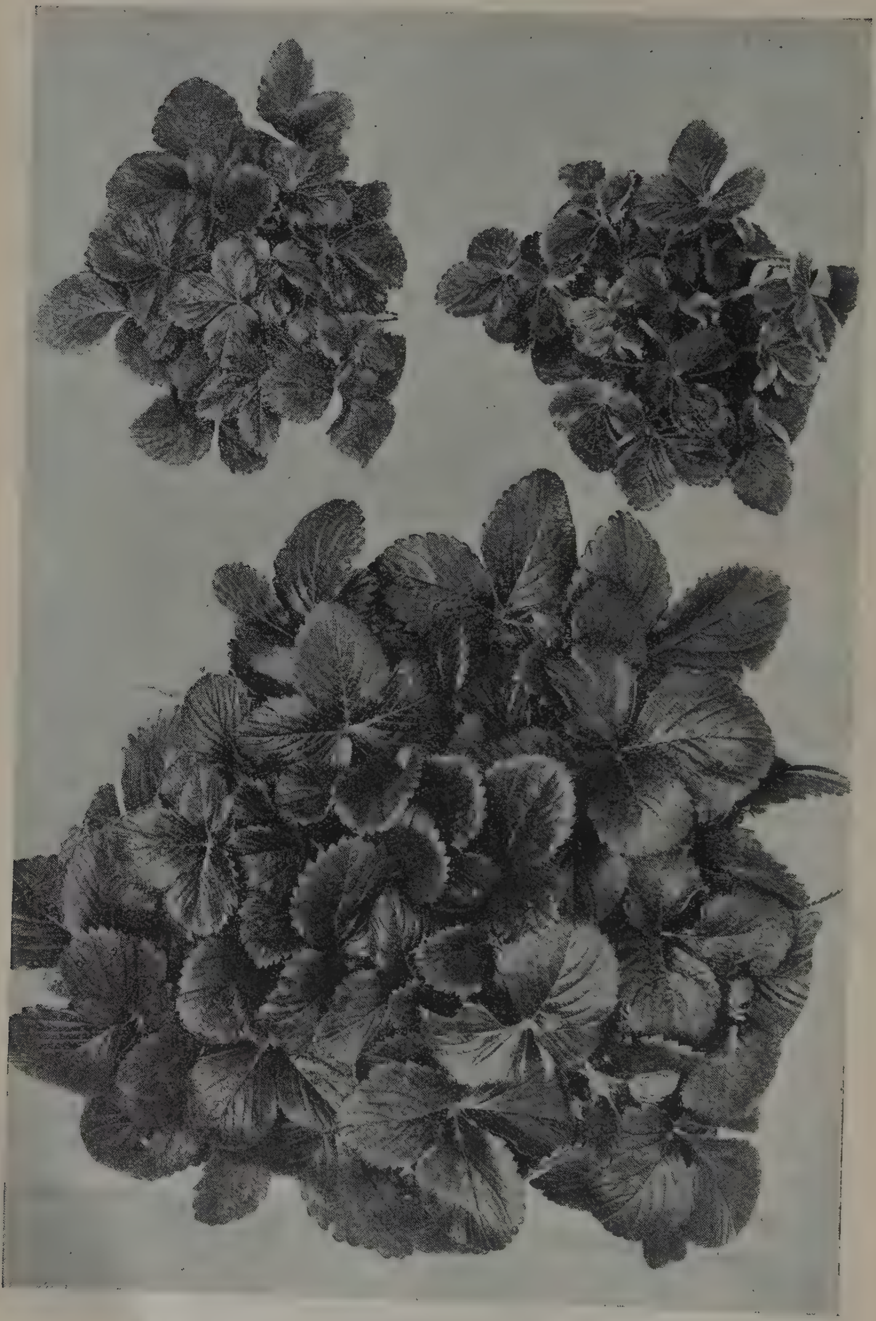


Plate 94.

VIRUS DISEASES OF THE STRAWBERRY.

Top left.—Crinkle; note mottling of leaves. *Top right.*—Yellow-edge; note deformed leaves and yellow edges. *Bottom.*—Healthy plant.

N.B.—These three plants were of the same age and were growing within a few feet of each other.

and puckering. Instead of the yellow margin, the characteristic symptom is a mottling produced by the presence of small, yellowish spots with ill-defined margins. In older spots, the centre turns a red or brown colour, so that when a leaf is held up to the light, each spot appears as a brown, dead area surrounded by a creamy yellow halo.

Plants infected with either of these diseases rarely carry a crop of fruit, and in such cases only a small crop, very often of deformed fruit, is set.

Mode of Spread.

Strawberry plants infected with one or the other of these virus diseases produce diseased runners. The planting of such diseased runners is the commonest method by which the diseases are spread. They are not transmitted through the seed and are incapable of living in the soil, so that unless infected from outside sources, seedlings, even from infected plants, are healthy.

Certain viruses are very easily spread by the contact of a healthy plant with sap from a diseased plant, but this is apparently not the case in the strawberry. Repeated attempts by overseas workers to transmit the disease by rubbing leaves with pads soaked in sap from diseased plants, pricking a healthy leaf through a diseased leaf, or injection of sap from diseased plants have proved unsuccessful. Hence, there seems no danger of carrying the disease to healthy plants on cultivation implements or on the fingers of pickers.

Transmission from a diseased to a healthy plant has been experimentally brought about by means of the strawberry aphis. Other insects and the commonly occurring red spider are not known to transmit the diseases.

Methods of Control.

In Europe and America it has been found that certain varieties of strawberries are more or less resistant to the virus diseases described above. *Fragaria chiloensis,* a wild type of strawberry, is highly resistant to yellow-edge, showing no symptoms although infected with the virus. Another wild type, *F. virginiana,* is highly susceptible, however. Varieties containing a high percentage of *chiloensis* blood are highly resistant to yellow-edge. Recent work in the United States has shown that certain strains which have been bred there show a marked degree of resistance to crinkle.

The most important varieties grown in Queensland, Phenomenal and Aurie, seem to be susceptible to both yellow-edge and crinkle. The position at present, however, does not call for such a step as the introduction of new varieties, as surveys show that it should be possible to control the diseases by other means.

As mentioned previously, the chief means of spread is by planting runners from diseased mother plants. To avoid this, the diseased mother plants should be rogued from the runner beds.

In Southern Queensland, strawberries planted in mid March are bearing towards the end of May, and the crop may continue until some time in December. The symptoms are much more pronounced during the cooler months. At temperatures above 80 deg. F. those of yellow-edge are masked and difficult to recognise. As Queensland's summer temperatures are well above this mark, the removal of affected plants should commence in winter in the early part of the picking season. The early eradication of virus infected plants has an additional benefit in that it reduces the probability of the spread of the disease within the plantation. The removal of affected plants is not a difficult procedure when carried out at the correct time and, moreover, no loss is sustained as these plants bear little or no crop.

It is preferable that a grower should save his own runners from plants known to be free from disease, rather than use plants of unknown origin. However, in cases where virus infection has been severe, runners should be obtained elsewhere from a more healthy area.

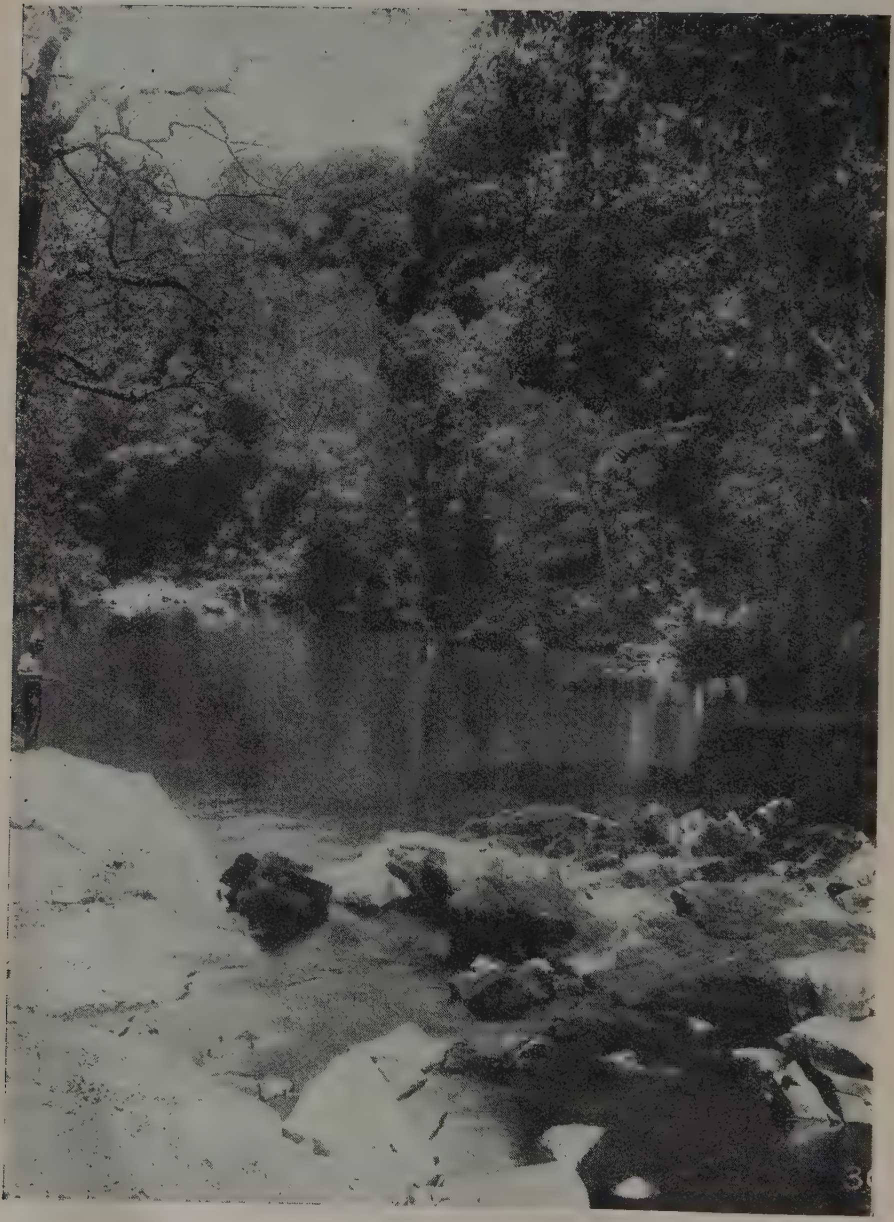


Plate 95.
QUIET JUNGLE-SHADED WATERS, EUNGELLA, NEAR MACKAY, Q.

Hints for Pig Exhibitors.

E. J. SHELTON, H.D.A., Senior Instructor in Pig Raising.

Selection of the Show Pig.

THE aim of the stud stock breeder is to breed and exhibit animals which will win a place in the best of company. The time the exhibitor is willing to give to the preparation of his stock and the businesslike attitude he adopts generally towards the job are also important factors. He will certainly learn by experience that there are times when a few extra minutes spent and additional care in handling may mean the difference between a champion, a first, a second, a third prize, or even no prize at all. Successful exhibitors thus spare no effort to ensure having their stock ready in ample time before judging, while their ability in handling the animal when it is paraded for judgment also counts.

Admittedly some animals are easier to handle than others. Some are good feeders; some have an attractive gait and intelligence; others may be good, but stubborn. Some pigs feed well in familiar surroundings, but when placed in the show pens become restless and disgruntled in their strange environment, refuse to eat, and so rapidly lose ''bloom,'' thus spoiling the exhibitor's chance in competition with other more docile and adaptable animals.

In selection, nothing but the very best should be considered. It is useless filling up show pens with second-grade animals. The size and importance of the show and the keenness of competition must, of course, be taken into consideration. To win a championship at a small country show is quite a different thing from winning the premier award at Brisbane, or any of the other major shows.

Studying the Schedule.

The exhibitor should study carefully the prize schedule months before he proposes to exhibit, and should aim at having his animals entered in classes for which they are most suited. A class for boar over nine months and under twelve months is more readily won, other things being equal, with a boar nearer twelve months than nine months old. The prize for sows with litter not more than ten weeks old is more frequently won with a really good sow with a litter ten weeks old, than with a sow equally as good, but with a litter only ten days old; in fact, the very young litter has little chance in keen competition, besides they are much more subject to injury in transit and in penning at the show. Size for age also is important. In a class for sow twelve months old, the sow should be well grown and be fairly forward in her gestation period; a sow not in pig does not—and should not—stand the same chance of winning, and certainly does not ''show up'' to the same advantage. The commercial qualities are even more important than those associated with appearance.

Freedom from Faults Desirable.

Animals with manifest faults should never be exhibited. A boar with one only testicle showing, a sow with several blind or dummy teats should not be considered for a moment. A pig with a long, unmanageable tongue which protrudes several inches from the mouth should not be shown, nor should pigs mismarked or definitely faulty in conformation.

It should be remembered that improvement in livestock generally—whether pigs, horses, cattle, sheep, or other animals—depends very largely on thoughtful selection of breeding stock, coupled with efficient feeding and careful management. The successful breeder recognises at once hereditary characteristics in his animals and, consequently, is able to take full advantage of the good points and blend them in such a way that the resultant progeny should be even better than the parents. Practically all the characteristics of economic importance in farm animals are hereditary to some degree. In pigs, for example, colour, easy feeding qualities, early maturity, prolificacy, milk production, and the length and conformation which characterise the modern long, lean, light-shouldered bacon type are all more or less hereditary.

Plate 96.

Typical representatives of breeds of pigs popular at Australian live stock shows. These animals are all in top show condition, and have been properly prepared in readiness for placing before the judge.

Condition.

Breeding stock should be shown in good breeding condition only; any tendency to excessive fatness should be strictly avoided. If breeding stock over twelve months old are any good as breeders and are shown in profitable condition, they will not be overfat. Similarly, animals in low condition are undesirable. Even a sow with a large litter should be in good condition, otherwise she will not show to advantage.

Commercial stock should be exhibited in prime fleshy condition only, for there is no demand for very fat meat, and the judge is definitely at fault who recognises and awards prizes to overfat animals. Excessively fat animals are not likely to prove profitable breeders.

Preparation and Handling.

Animals with a vicious temperament should be excluded from the show ring and should not be kept on the farm. Even ordinary good-tempered pigs must be prepared and always be handled with great care.

The tusks of all boar pigs over six months of age should be cut or sawn off long before the animal is to be penned for show; in fact, the tusks should be removed whether the animal is to be exhibited or not, for boars are notoriously unreliable, and even the quietest of them will at times turn suddenly and show fight. On several occasions in recent years owners or attendants have been ripped in the leg by tusks of boars which were ordinarily very quiet and docile when on the home farm. The most useful instrument of all for the removal of boar tusks is a pair of blacksmith's bolt cutters. Advice on this matter may be obtained from the Department of Agriculture and Stock.

Great care also should be taken in entering the boar pen and in handling the suckers when the sow and litter are together, especially at show time when the animals are being continuously roused up by visitors. This is most important and instructions should be strictly carried out.

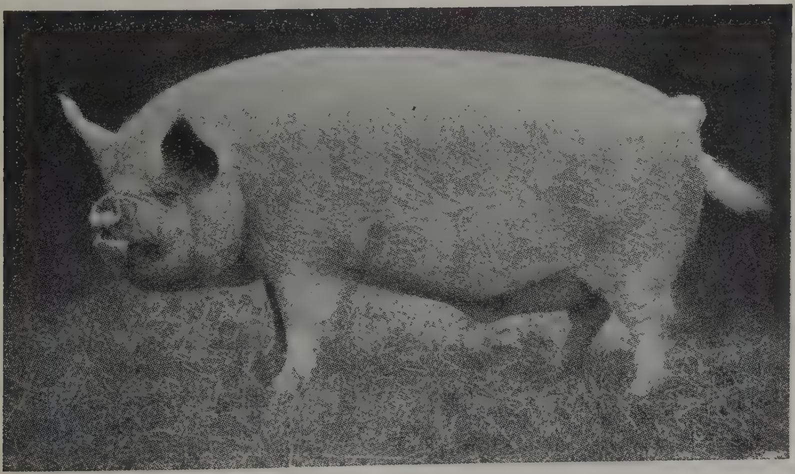


Plate 97.

A champion Middle White, shown in wonderful condition, possibly too fat for use in a warm climate. Note fine silky hair, nice brush on tail, and contented appearance of this animal.

Oiling and Preparing Skin.

It is unwise to smear the skin and hair with a heavy coat of sticky oil. It is equally unwise to permit the exhibition of pigs without first thoroughly washing and cleansing the skin and hair. Regular washing with warm water and soft soap should be the rule for several weeks before the date of showing. The exhibitor who pens pigs bespattered with mud and in a dirty condition only exposes himself to criticism. Careful washing and grooming, brushing over with a brush or cloth, or spraying—using colourless oil—is advised, and especially immediately before parading. Regular oiling will assist in keeping the animals free of parasites, and in mellowing the skin and hair with obvious advantages. It will be noted also that the animal itself appreciates this extra attention.

In the exhibition of stud pigs, clipping of the hair is always objectionable. It is not really necessary, and any attempt to clip with a view to removing natural mismarkings is an offence.

The animals should be carefully trained to parade properly and to stand at ease before the judge. The anxious, excitable animal—especially if in charge of an excitable attendant—usually fares badly, while the well-trained animal in the hands of a patient, observant exhibitor is more likely to succeed.

Judging Rings.

It is, of course, essential to parade all mature animals before the judge, for it is quite impossible to judge mature stock satisfactorily while they are penned in small enclosures. Judging rings or lanes are desirable where they can be arranged for, provided that the animals are well-trained, and that exhibitors are prepared to devote time to the job. In fact, pig judges should specially urge show societies to give this matter the attention it needs; otherwise it will probably be forgotten.

Exercise and Feeding.

Regular exercise is essential to the successful exhibition of pigs, plus plenty of green food and clean drinking water. Purgative medicines should not be used, nor should foods of a very laxative nature. The amount of food used should be strictly limited during the period the animal is on show.

It is wise to accustom the animal for some weeks beforehand to the same food it will get at the show; otherwise change of diet might upset the digestive organs and cause illness, loss of appetite, and "bloom."

If the animal refuses to eat and appears to be fretting and losing condition, a slice or two of apple or carrot, a piece of pumpkin, or some such tasty morsel—especially if sprinkled with salt—will often bring the animal back to its food. In fact, a very light sprinkling of salt over the food occasionally, followed by clean drinking water, will be found useful for show pigs. Clean dry straw, and plenty of it, is advisable for bedding down, and will make the animal feel more at ease. Sawdust, shavings, corn husks, or leaves are not advised if it is possible to substitute straw. The pens must be kept clean, and soiled bedding and dung must be removed regularly every two or three hours.

General Instructions.

It is unnecessary for the exhibitor to appear before the judge in "pig pen togs"; he should be just as spic and span as the animal. A combination of both, added to a pleasant, courteous manner, and a smile even under difficult circumstances, does much to create confidence. The exhibitor should watch the animal during judging; he should not watch the judge except to receive advice or instructions. When the judge has finished with an animal, its owner should not worry other exhibitors who are just as keenly interested in their own exhibits as he is in his. The judge has a difficult task and appreciates the co-operation of exhibitors in placing the animals before him as required. Exhibitors should not try to influence the judge, but should be ready at any time to answer questions the steward might ask. When judging is completed, the exhibitor should await a favourable opportunity for having a chat to the judge about the exhibits. Shows are educational, and are for the purpose of providing comparisons. Exhibitors are, of course, entitled to their own opinions just as much as the judge. The judge should plan his movements so as to enable him to spend sufficient time discussing awards with exhibitors.

Agricultural societies are always glad to have suggestions from exhibitors. Every exhibitor is, or should be, a show society member, and should, therefore, have some influence on the success or otherwise of the show. Member exhibitors have the privilege of sending in nomination of sectional judges for consideration by the show society concerned.

It is well to remember, too, that it is only fair to other exhibitors of pure bred animals that the stud pigs of all breeders concerned should be registered in the appropriate herd book, or be eligible for registration. The Australian Stud Pig Breeders' Society provides for registration of all breeds here.

It is wise also to have printed pedigree forms for stud pigs, and it is important to have the pedigrees prepared beforehand in readiness, so that when an animal is sold, the pedigree may be handed over with the cash receipt. Delay in the issuing and forwarding of pedigrees, and the preparation of pedigrees which are lacking in detail cause trouble, confusion, and unnecessary inconvenience to the buyer. All stud sales should be on a cash basis, and delivery should be subject to this consideration.

Judicious advertising should not be neglected. The Stud Pig Breeders' Society will advise any breeder interested as to the prices he or she should ask for pedigree male or female animals, on the costs of advertising and on similar matters. The Department of Agriculture also advises on these points.

Despatching, Crating, Loading.

Full particulars about the size of crates, material to be used, method of construction, and other relevant information may be obtained at any time from the Department of Agriculture and Stock, free of cost. Crates should be returned promptly, if required, and in as good a condition as when received. Freight on returned empty crates should be paid after proper consignment notes have been made out and signed. The full name and address of sender and of the person to whom consigned should be affixed in a conspicuous position on the crate.

It is wise to remember that pigs in crates *will not be accepted* for transport by shipping companies as cargo on passenger or tourist steamers or on first-class overseas liners, nor will they accept for some places—such as Darwin, New Guinea, and Fiji—unless space, feeding, and attention has previously been arranged for. Shipment in such cases would be by cargo steamers, or as otherwise arranged.

Prior advice regarding despatch of the stock, prompt despatch of pedigree and prize records of parents and the general business-like attitude of the breeder towards the clerical part of the job is most important, and should not be neglected.

Plate 98.

An entrant in sow and litter (Large White) competition in which at some shows the points are allotted 60 to litter and 40 to sow. The sow has given of her best to her babies, and in consequence is not carrying the condition she otherwise would have for show purposes. The litter is well developed, and indicates prolificacy and thriftiness.

Rail Transport of Stud Pigs.

Where stud pigs (or other pigs) are being transported by rail to shows or other destinations, prior arrangements should be made for necessary space in the rail wagons used for that purpose. Pigs forwarded loose would be transported in wagons for which the symbols used are "L," "MGP," and "FP," and in which one or both decks may be used as provided.

Crated pigs are conveyed in other convenient type wagons, but will not be accepted for carriage on express passenger or mail trains.

Pigs in crates are charged first-class rates, the freight being determined by machine weight. Where two or more pigs are forwarded in one crate and the weight exceeds two hundred weight, the rate will be increased to that of a $\frac{1}{2}$L van.

Note should be made of the 20 per cent. rebate allowed on the transport of pigs for breeding purposes, and of which particulars may be obtained from station masters. Where long distances are to be

Plate 99.

Another entrant in the sow and litter (Berkshire) competition. In this case the points would be more evenly distributed because the sow is in nice show condition and the litter could not be better. Well marked, well developed, and very attractive.

Plate 100.

The Wessex Saddleback grows rapidly, and is of a contented disposition. These young pigs are in course of preparation for stud purposes, and would be in excellent condition for exhibition in "under four months" class.

travelled, it will be necessary for the consignor to make prior arrangements for feeding and attention to the animals at a station at which there is continuous attendance of a station master, and of which information may be obtained on application to the railway people. Where feed is supplied by consignor and is attached to the crate, it may be arranged for one of the railway men to feed the animals en route, but this arrangement is purly a personal one and is not provided for in the regulations.

Water is not supplied *en route* unless attended to by consignor or his agent.

In case of long distance transport, it is sometimes possible to arrange for fast transit by express goods trains.

Trucking, Feeding, Insurance.

Arrangements may usually be made through stock and station agents for feeding and attending to crated or pigs loose in trucks *en route*. The cost of this service should be borne by the purchaser, who also should pay rail freight at the destination, unless the receiver's station is a "gate" where there is no official regularly on duty. In all such cases, freight must be prepaid, and any rebate allowable should be claimed when adjusting freight.

Insurance companies will not usually accept live pigs as "stock," and unless arranged for specially they will not quote for any other than a transit, "farm to farm" cover. It is essential in the interest of the business that these matters be inquired into before stock are quoted, especially for long distance and overseas orders.

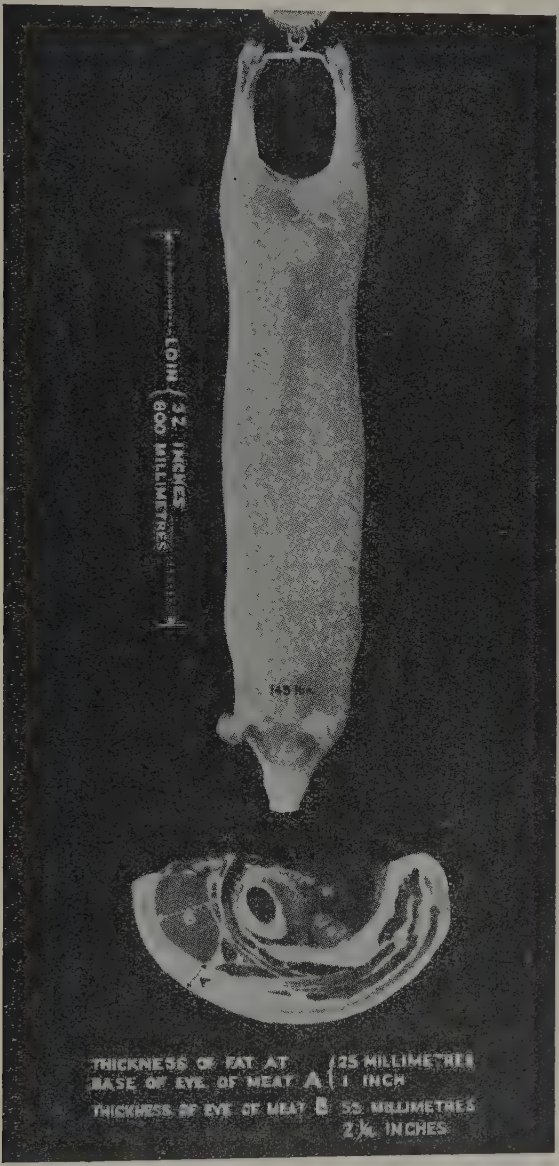
Feeding on board ship can usually be arranged for through the ship's carpenter. In all such cases, the people concerned look quite reasonably for a gratuity for rendering such a service.

Financial Assistance.

Those interested in the importation of stud stock from overseas should place themselves in communication with State Departments of Agriculture, where full particulars can be obtained relating to schemes of financial assistance to importers of pedigreed animals. The conditions are subject to variation from time to time, hence cannot be included in detail in these notes.

Trucking of Pigs and Calves.

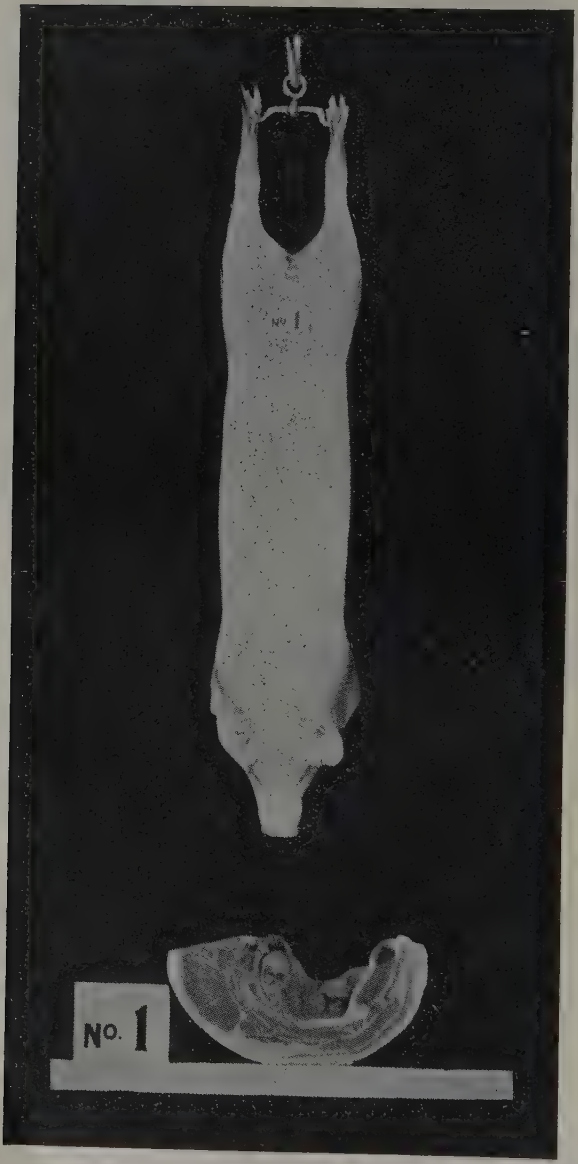
The Queensland Railway Department for some months past has been fitting a number of the smaller type sheep and pig trucks with a partition on each floor, in order to keep the pigs separated from small calves loaded at the same time by farmers and buyers. All concerned are notified that waggons of this type must be ordered when mixed consignments are to be loaded. This service of the Railway Department will be appreciated by all sections of the trade, for apart from the prevention of cruelty aspect, both pigs and calves will arrive at their destination in very much better condition.


LOIN {32 INCHES
800 MILLIMETRES
145 lbs.
THICKNESS OF FAT AT
BASE OF EYE OF MEAT A {25 MILLIMETRES
1 INCH
THICKNESS OF EYE OF MEAT B 55 MILLIMETRES
2¼ INCHES

[Photo. by courtesy of A. H. Simons and Jos. B. Swain, from the Empire Pork Review.

Plate 101.

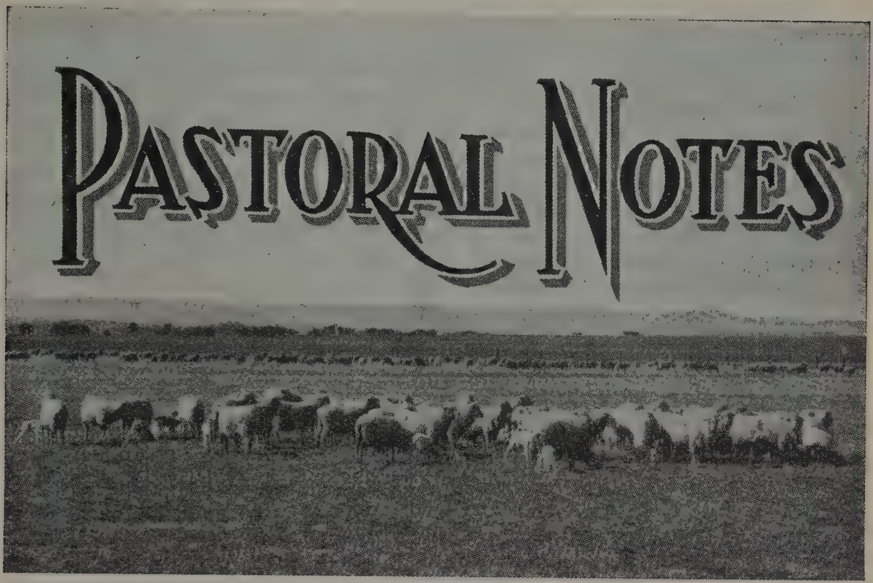
The Ideal Export Baconer Carcase.—Note length, evenness, clean, attractive appearance, and freedom from coarseness of this ideal export baconer. The cut portion indicates that the overseas market prefers pigs in prime, fleshy condition, for there is no profitable market for overfat pigs. Dressed weight (in this case) 145 lb., under Queensland conditions would indicate a live weight of 199 lb., a weight too heavy for Australian requirements but suited to a good class overseas trade.



[*Photo. by courtesy of A. H. Simons and Jos. B. Swain, from the Empire Pork Review.*

Plate 102.

THE IDEAL PORKER CARCASE.—Note clean, attractive appearance, freedom from fault, length, fleshiness, and evenness of carcase. The cut portion suggests a very lean carcase with fat and lean nicely streaked. Dressed weight 70 lb., which, under Queensland conditions, would indicate live weight at approximately 100 lb., a very useful weight in the frozen pork trade and also for Australian requirements.



Acute Bloating of Cattle.

W. DIXON, Inspector of Stock.

ACUTE bloating of ruminants, cattle particularly, may occur at any time from a variety of causes, but most commonly through turning hungry cattle on to luxuriant green feed, or on to herbage country, after heavy rains and when the young herbage is making rapid growth.

Under station conditions, where stock are not seen every day, little can be done to prevent losses, but on smaller holdings losses may be minimised if a stack of dry hay is provided and to which stock have access before and after being allowed on to green feed. The long, dry hay assists regurgitation, which is difficult when large quantities of short, succulent feed has been eaten, and, if it is available, animals will always take a few mouthfuls, with beneficial results.

Symptoms of bloating appear quickly. Animals stop feeding and stand still with arched backs, turning their heads frequently to the abdomen, which increases rapidly in size—the swelling becoming most marked on the left side. As the abdomen enlarges, breathing becomes more and more difficult. In very acute cases the nostrils dilate, the animal stretches out its tongue, bellows, and finally staggers and dies in convulsions.

In less acute cases the development of gas is slower, and frequent belching and vomiting prevents its excessive accumulation. In these cases the use of a gag made from a stick about 8 inches long and 2 inches in diameter, with holes at each end through which a thin rope is run to form a rough bridle—the stick being smeared with tar or grease before being put into the mouth—is of value, as it facilitates belching.

Massage of both flanks, applying moderate pressure with both fists upwards and downwards—particularly over the whole of the left flank—while the animal stands with its head uphill, is also beneficial.

Puncture of the rumen with a trocar and canula saves many valuable animals. The instrument must be sterilised by boiling for ten minutes before use. It is wise to keep it ready, wrapped in a sterile towel. The trocar, with its protecting tube, is pushed into the most prominent point of the left flank, usually midway between the point of the hip and the middle of the last rib. Holding the instrument in the left hand, a sharp blow with the palm of the right hand causes it to penetrate the skin, abdominal wall, and the rumen.

The point of the trocar is directed towards the right elbow.

The trocar is withdrawn gradually from its sheath, allowing the gas to escape slowly, giving immediate relief to the animal.

When gas ceases to escape, a cork may be used to close the canula, which is left in position and secured by a clean bandage tied over it and round the body of the animal. Any further accumulation of gas is allowed to escape slowly by removing the cork. When no longer required the canula is withdrawn, and the small puncture dressed with tincture of iodine.

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PALATABILITY OF FEEDS.

While the cost of the ration fed to dairy cows is likely to influence its composition, consideration should also be given to the palatability of the feeds selected. Nothing should be fed to the animals which will affect the quality of the product yielded. What is suitable for one animal may not be suitable for another, and the method of using stock foods governs their value. For producing animals—*i.e.*, animals converting the food eaten into some product such as milk—it is essential that they should eat enough. In order to guarantee this sufficiency, care should be taken to ensure that the ration fed is wholesome and palatable.

Unless the ration is palatable, cows and fattening pigs will not consume sufficient food for the efficient production of milk and cream, and bacon. Unpalatable foods which have to be fed to milking cows should be used sparingly and mixed with some other well-liked feed. In this way, the bulk of the ration can be increased, the more palatable ingredients inducing the animal to consume the whole of the mixture. Roughage can be chopped and mixed with concentrates. The roughage often becomes softer and the mixture more wholesome and appetising by mixing it with a dilution of molasses.

It is only by feeding rations of a palatable nature that the maximum production can be obtained from live stock. At the same time, it must be remembered that an important function of farm animals is to convert into useful products material which would otherwise be wasted. By keeping a watch on the materials at hand, it should be possible to dispose of practically all the feed available in a way which will ensure the best return.

WOUNDS IN HORSES—SIMPLE TREATMENT.

The fundamental principle underlying all wound treatment is the provision of suitable downward drainage for the discharges from the wound. If such drainage is provided, then most wounds tend to heal well, but deep wounds penetrating downwards and which form pockets do not progress satisfactorily, for the reason that pus and discharges collect within them and cannot get away. Wounds which penetrate in an upward direction need little treatment, beyond ensuring that they remain open while healing from their deepest part and that they are reasonably clean on the surface. In the case, however, of downward penetrating wounds, it is necessary to use a knife judiciously in order to allow the discharges a free outflow.

Before any wound treatment is attempted, the injured edges of the wound should be clipped with scissors to remove the hair and reveal the true nature of the wound. The next thing to do is to wash the wound thoroughly with a warm, weak disinfectant solution. Then, if necessary, the depth of the wound can be explored with a blunt probe which has been boiled, or with the fingers after the hands have been thoroughly washed and scrubbed. Punctured wounds—such as nail or stake wounds—are always difficult to drain and often have to be opened up. Microbes are carried in when the foot is punctured, pus of a black liquid and foul smelling nature may gather in the foot, and may continue to accumulate because it cannot drain away. If that happens, acute lameness is certain to follow. If unattended, these corrupt fluids rise slowly above the level of the horn and eventually break out through the soft skin over the coronet; but by that time the structures within the foot are in a nasty mess and the case has become very serious.

To treat hoof punctures, the whole foot is cleaned and, if possible, it is held in a bucket of warm disinfectant solution to still further cleanse it and also soften the horn. The sole of the foot is then pared away by making a cone-shaped hole at the point where pain is most acute. The apex of the cone must be carried right through the horn until blood or pus is revealed. The pus should then be allowed to drain away. To prevent the hole from closing, a pad soaked in a solution of iron perchloride should be placed in the wound and the treatment should be repeated daily while necessary. If treated thoroughly in the way described little further attention is necessary.

* * *

ROTATIONAL GRAZING.

The practice of grazing paddocks throughout the year according to a pre-arranged plan of rotation—although highly successful in countries with a reliable rainfall—is not practicable, as a general rule, in Queensland. The main object of rotational grazing—the regular provision of short, young grass—can, however, be achieved as far as weather conditions will permit by submitting each paddock to short and intermittent grazings, rather than to continuous grazing. In order that this practice of intermittent grazing may be applied in an efficient way, it is necessary to subdivide a fairly large number of paddocks, each of which may be grazed down by the available stock within a short period and then rested.

Broadly speaking, the system of management recommended for dairy pastures is to concentrate the producing stock on a paddock of young, leafy pasture for a few days, and when it has been eaten down fairly closely, transfer the stock to another paddock of young grass; and so on, coming back to the first paddock some weeks later, when good feed is again available on it.

Since the pasture in different paddocks may vary in its rate of growth, no definite orderly rotation may be possible, but each paddock may be grazed and spelled intermittently.

—*C. W. Winders.*

BLIGHT IN CATTLE.

Blight in cattle may again become prevalent in the coastal areas of the State during the wet season.

This is a highly contagious disorder, and, apart from losing condition, many animals become blind. Treatment should be applied as soon as the trouble is noticed.

The following solution is very useful in treating the complaint:—

Nitrate of silver	3 grains
Sulphate of morphia	1 grain
Soft water	1 ounce

An alternative and less expensive remedy is a mixture of 2 per cent. zinc sulphate and 2 per cent. boracic acid in water that has been boiled.

All eye discharges should be washed from the face of the beast and vaseline applied to the area covered. The discharges attract flies; while flies continue to irritate the animal a cure will be long delayed, if not prevented entirely.

The affected eyes should be syringed in the early morning and late afternoon. A small bulb syringe is quite suitable for applying the solution.

DERMATITIS.

A condition manifested by intense irritation, and development of dropsical swellings, and later death of unpigmented surfaces of the body, sometimes occurs during summer in country where trefoil and St. John's wort grow. It is only on white unpigmented patches of the animal's skin that the condition appears. Pigmented or coloured portions of the skin remain unaffected. Feeding experiments have proved that the ingestion of these plants, together with exposure to strong sunlight, bring about the condition. Cattle so affected show signs of much irritation, biting and licking themselves. Within a few days excoriation of the skin of unpigmented areas occurs. Animals become feverish and lose condition rapidly.

Sheep are affected similarly; the ears and face become thickened and dropsical, and the lips become hard and leathery. If shade is provided, animals seek it readily to obtain relief.

Staining of white patches on cattle with ordinary washing blue is protective. An application of a solution of permanganate of potash made with rain water to a deep pink colour gives relief.

—*W. Dixon.*

STOCK WATERING FACILITIES.

On many grazing properties in Queensland there is sufficient surface water to last until June or July in a normal year, and possibly until August in a good year, when there has been a heavy wet season. There is a period between the time that the surface water dries up and the first storms fall in which it is necessary to provide water, either by well or bore.

When selecting a site for a well or a bore, the grazier should first make a survey of his country. A site should, if possible, be selected on a part of the property where cattle do not feed intensively when surface water is available. On a number of grazing properties the mistake has been made of putting down a bore in close proximity to surface water. As the surface water dries up, the grass in the immediate vicinity is also eaten out, and when it is necessary to pump water for stock there is often no grass in close proximity to the bore or well. As a result, the stock are forced to walk long distances to grass.

When bores and wells are put down in places away from surface water, there will probably be grass near at hand in a dry time, and cattle will do better, drink oftener, and retain condition that they would otherwise lose through excessive walking.

—*Jas. Carew.*

Plate 103. [*Photo.: Lands Department.*

A DAIRY FARM IN THE MAKING.—Newly cleared and grassed rain forest country at Granadilla, North Queensland.

The Dairy Farm

Effect of Disease on Composition and Yield of Milk.

THE effect of disease on milk from cows is variable. Usually there is an alteration in composition, accompanied by a decrease in yield. Generally speaking, the milk-sugar (lactose) is considerably decreased and the chloride and ash content increased. Fat is more likely to be increased than diminished. Casein is likely to be lowered and albumen increased, whilst the total protein may remain constant. A consideration of one or two important diseases will illustrate the changes that may occur.

Mastitis is one of the commonest diseases in this country, and analyses show that the casein, fat, and lactose are markedly reduced and the chlorides increased in milk from cows suffering from this malady. Casein and fat are the all-important substances in the manufacture of cheese, and a deficiency of these constituents in milk means a lowered cheese yield at the factory. The importance of this disease in relation to cheese making is, therefore, very evident, and only serves to emphasise the need for greater care and vigilance on the part of all concerned in the dairying industry.

Foot and mouth disease is not known in Australia, but analyses of milk in countries where it occurs show that drastic changes are wrought in the composition and yield of milk. One of the most noticeable effects of the onset of this disease is a very marked reduction in the volume of the milk secreted—often to one-quarter of its original quantity. The changes in composition depend very much on whether the udder is inflamed or not. If the udder is inflamed, then the changes in composition are very similar to those that occur in cases of mastitis. When the udder is not inflamed the fat, protein, and ash are increased and the lactose diminished. The fat may rise to as high as 10 to 15 per cent., the protein to 5 per cent. (normally 3), and the lactose diminishes to 3 or 4 per cent. (normally 5).

It is rather curious and interesting to find that the composition of milk when a cow dries off is very similar to that from a cow with foot and mouth disease, without inflammation of the udder. Drying a cow off usually involves a considerable reduction in her feed, together with less frequent milking, and it is suggested that there is a similarity between these conditions and those that occur in severe disease. In cases of disease there is a marked decrease in the food intake, and the milkings are apt to become less frequent. The abnormality of milk and the decrease in yield brought about by these two diseases alone indicate the economic importance of disease in regard to the dairying industry. Anything that the individual farmer may do towards improving the health of his herd will not only be of benefit to himself, but to the industry at large.

—*O. St. J. Kent.*

DAIRY PASTURES.

Efficient production is the only form of economic production, and this, perhaps, applies more to dairying than to any other primary industry.

Efficiency is achieved by ensuring that cows receive the right food in the right quantities. The cheapest means of filling the first requirement is by herd testing and culling, since by this method only high-producing cows are maintained on the farm.

Nowadays, the value of dairy land is judged, not by the number of cows it will carry, but by the butter-fat production per acre. Once this idea is fixed in mind, it becomes obvious that the higher the cow yields the more economic a producing unit she becomes. Low producers mean reduced output and reduced efficiency in the working of the farm.

As the dairy cow is required to produce large quantities of milk which is rich in protein, it follows that it must be given foods which are likewise rich in protein. There is little difference between the food values of the various popular cultivated grasses, which in the early stages of growth are equal in protein content to many valued concentrates. The young shoots are very rich in this respect, and this accounts for rapid recovery of cattle grazing on pastures after rain following spells of dry weather, or after a burn.

Here, then, is a natural food for the dairy cow readily available. It is economic, too, because with a little care it can be produced in large quantities, and it requires no labour in feeding. The dairy pastures then deserve special attention to maintain them at an efficient standard. There are several ways of maintaining and improving pastures, namely:—

(1) The growing of grasses which have a high feeding value.
(2) Top-dressing pasture land.
(3) Rotational grazing, or, in other words, feeding the grass while in its young stage of growth.
(4) Renovation of pastures.

In selecting grasses, attention must be given to their adaptability to local conditions, period of growth and production, nutritive value, palatability, and suitability for grazing and hay making. The length of the grazing season is increased and the returns improved by the use of top-dressing. Its practicability depends on the increased returns in terms of cash.

Rotational grazing does not involve so great an outlay and is more a matter of pasture improvement by ensuring the economical use of herbage. The subdivision of holdings to provide rotational grazing appears to offer a ready means of immediate benefit through pasture management. And now is the time to act. It will be too late to achieve any advantage if it is left to make a start when the season turns dry.

—*C. W. Winders.*

POINTS IN DAIRY PRACTICE.

Maximum results on the dairy farm can only be obtained by the successful combination of three factors—the farmer, the pasture, and the stock. The farmer must efficiently manage and improve his pastures, while the stock must give the highest possible amount of milk fat from the quantity of food consumed.

The farmer may claim that he has good cows and produce factory returns as evidence thereof. That evidence, however, is merely proof that the herd is good, not that each individual member is good. Until he submits his herd to regular testing, he has no definite proof that his herd contains no unprofitable cows, that his herd sire is at least maintaining the production in the younger stock, or that he is breeding from the right cows. A record of any drop in factory returns is an open book to the regular testing farmer, but a sealed book to the farmer working solely on factory returns.

If the position is to be improved by herd testing, the responsibility is on the farmer to consider the individual results and carry out the necessary remedies. Failure to act on the part of the farmer cannot be held against herd testing.

The fertility of the land must be maintained if the pastures are to carry the stock economically. Each cow returns to the soil a proportion of the plant food it consumes in the form of manure, which should be regularly broken up and distributed by harrows. The plant foods which are not returned to the pastures are those which make the milk and those used to produce and maintain the body of the animals. A cow which produces 500 gallons of milk in a lactation period, equivalent to approximately 200 lb. of fat, removes from the pasture at least 7 lb. of lime and 11 lb. of phosphoric acid in the milk alone. This is equivalent to approximately a half-hundredweight of bonedust or superphosphate. Thus a herd of forty such cows would remove yearly the equivalent of 1 ton of those fertilizers from the pasture. As a large proportion of Queensland soils are deficient in phosphorus, particularly in coastal areas, a loss such as this is a very serious matter, and if not returned to the soil in some form, pastures will deteriorate, and conditions conducive to the occurrence of stock diseases peculiar to phosphorus deficiency may develop.

There are various ways in which these plant foods can be returned to the pastures. The obvious method is to distribute the phosphatic fertilizer over the pastures; a less obvious but efficient method is to administer at least 2 oz. of bone meal to each cow daily. This weight only makes good the calcium and phosphorus removed in the milk and is distributed over the pastures in the droppings.

The introduction of improved pasture grasses and the adoption of rotational grazing would also assist materially in obtaining the maximum efficiency on the dairy farm.

—*L. A. Burgess.*

SOME FACTORS IN PROFITABLE DAIRYING.

The first essential is to have every cow in the herd tested to make certain that she is worth keeping. As the animals must be adequately and properly fed, the next important factor is that governing production.

A good water supply is necessary. An ideal condition is, of course, sufficient water at convenient points in every paddock. Many dairy farmers, however, are satisfied with at least one good watering place. That means that if the herd is feeding at a distance from the water the cows do not go to the trough to drink as frequently as they would if it were closer to their grazing ground. On hot days it takes quite a lot out of animals to walk any distance, and when they do come in to water they stay in its vicinity. As the area surrounding the water is usually bare from over-grazing, they get very little to eat. So, in either case, the milk flow is seriously affected.

Another point which is often overlooked is the destruction of grass and herbage caused by the extra tramping of the animals going to and fro. Cows frequently destroy more feed with their feet than they actually eat.

Subdivision of paddocks will provide succulent pastures carrying a full complement of proteins, which the cattle relish and clean up as they proceed without tramping half of it into the ground. With pastures under complete control, the herbage and grasses can be fed off as required; and, in times of plenty, all surplus growths may be mown and conserved either as hay or ensilage.

THE IMPORTANCE OF THE SEPARATOR FLOAT.

Probably the most neglected part of the separator is the float, the function of which is to regulate the flow of milk into the bowl.

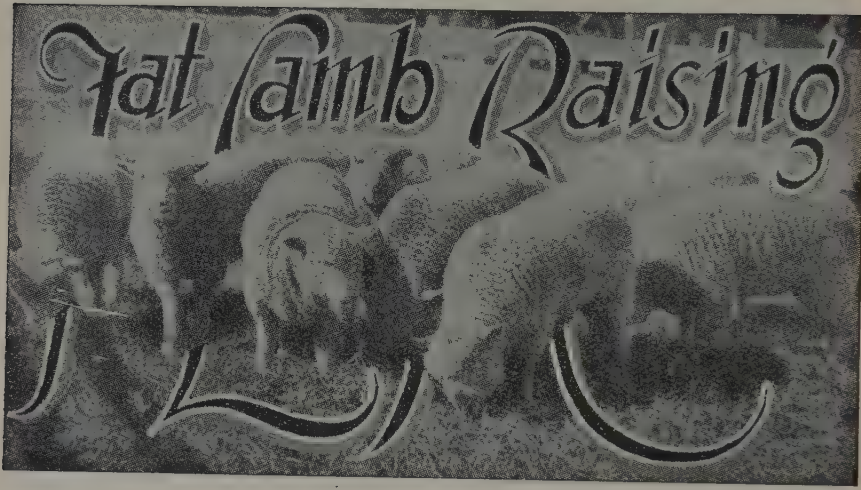
This means that it should be perfectly balanced, otherwise an irregular flow occurs and inefficient separation and fluctuation of tests result.

It has been frequently found that floats are badly dented or leaking. To this condition is added the danger of throwing the float out of balance by unskilful repairs. It has also been found that leaking floats have been repaired without first emptying them, which makes them heavier than designed.

Probably the most serious aspect of damaged floats is the fact that cracks and badly soldered joints provide just the right conditions for the growth of bacteria. Consequently, milk passing over them becomes contaminated, resulting in many cases of cream being graded down.

Dairymen would be well advised to give consideration to this matter, and when repairs are necessary to have them done by a competent tradesman, who should be advised of the importance of the work.

—*S. E. Pegg.*



Sheep on Coastal Farms.

COASTAL farmers who are desirous of stocking sheep usually ask the question how to start to the best advantage. Conditions and circumstances along the coast vary so greatly that no hard and fast rules can be laid down.

It is usually considered that where dairying, pig raising, and mixed farming can be successfully combined in coastal areas the conditions are favourable for fat lamb raising. There is one chief guiding point, and that is, where the rainfall can be considered as excessive for the combination mentioned, it will be decidedly against the wellbeing of sheep.

For fat lamb raising the British breeds should be used. The most suitable of them is the Romney Marsh, and the wetter the conditions the nearer to the pure Romney Marsh the breeding flock should be. If crossbred or Corriedale ewes are not available, then strong-woolled, plain-bodied merino ewes should be introduced, to which should be mated pure Romney Marsh rams. Of the progeny, ewes should be retained for breeding and the wethers used for home consumption or sold as fat lambs. Merino ewes should not be retained on the coast for longer than two seasons.

All lambs should be marked during August, and the ewes shorn in September. If the ewes are healthy and well fed from the time the lambs are dropped, all lambs that are to be sold should be fit before or during December. A month after the lambs are disposed of, the ewes that are to be sold should be fat and sold as such to secure best results. Healthy merino ewes with good teeth and carrying not more than four or five months' wool should fatten on good feed in three or four weeks.

—*Jas. Carew.*

AN AVENUE OF PROFIT FOR THE SHEEP MAN.

It is admitted by those in a position to know that one of the more important retarding factors in the fat lamb industry is the meagre supply of crossbred ewes. This applies not only in Queensland, but all over Australia.

Excellent crossbred ewe lambs, bred the right way, are regularly slaughtered as fat lambs. This is wrong in principle, although easily understood. Farmers generally are not in a position to refuse the remunerative figure offered. The opportunity exists, therefore, for the man further out, especially on some of that excellent country reclaimed from pear infestation, to join long-woolled rams with the robust type of merino, with the object of retaining the ewes of the drop for sale to fat lamb raisers nearer in and on the dearer country. The wethers of the drop should be disposed of as fat lambs.

The profits to a grazier adopting this policy are undoubted.

—*J. L. Hodge.*

HEREDITY IN SHEEP.

None of the domestic animals respond quicker to careful breeding than the sheep.

It may be taken, with some exceptions, admittedly, that like begets like—hence the importance of what is called prepotency in the sire. This power is especially important in the merino, when it is estimated that fully 80 per cent. of the animal's qualities are in the fleece.

To the careful student of breeding, prepotency in the sire is chiefly indicated in the head. This must be entirely masculine, with a bold eye, strong horn, well sprung, and with the head and neck well let into the shoulders. No matter how well a ram is covered, if the head is wrong disappointment usually follows his use in the stud.

The quality, conformation, and constitution of the ewes, too, is of great importance, and it is in the successful ''nicking'' of the sexes that the truly great studmaster shows that inherent gift which is born with him.

—*J. L. Hodge.*

RIGHT TYPE OF EWE FOR FAT LAMB RAISING.

No matter what ram is fancied, if merino ewes form the mother flock, the fat lamb raiser is handicapped in the matter of profitable weights at an early age, or in other words early maturity.

The ewe most suitable for the production of early maturing sucker lambs for export is got by the use of rams of one of the long-woolled breeds—such as the Romney Marsh, Border Leicester, or Lincoln—on the strongest, boldest type of merino ewe procurable. The ewe lambs from the resultant drop should be retained as the future breeding flock.

Pure-bred Corriedale ewes also are recommended as dams in a fat lamb raising flock.

On either type of ewe a Downs ram—such as the Southdown or Dorset Horn—should be used.

The ewe flock should be maintained in good strong store condition until lambing time. After lambing, no feed is too good for the ewe and lamb.

Under favourable conditions, fat lambs should be marketed at four months of age.

—J. L. Hodge.

CARE OF THE FAT LAMB EWE FLOCK.

Some farmers have the prospective mothers of the fat lamb drop too fat for the purpose. This is wrong in two ways. Firstly, with too much condition a light lambing is likely; and, secondly, feeding the ewes at mating time on grown crops is wasteful and unnecessary.

The ewes should be in strong store condition. It is advantageous to "flush" the ewes on green feed a fortnight before mating. No feed is too good for the flock when the lambs are dropped.

Beware of jetting with an arsenical preparation before joining. This results very often in a poor lambing. If jetting is necessary, the job should be done six or seven weeks before the rams are joined.

Crutching the ewes a month before lambing is advisable.

Careful watch should be maintained for internal parasites, and systematic drenching undertaken so as to free the ewes of the pest long before the lambing season.

Avoid unnecessary yarding with the in-lamb ewes.

Provide a lick suitable to compensate for known deficiencies in the pastures.

—J. L. Hodge.

A SIMPLE SQUEEGEE.

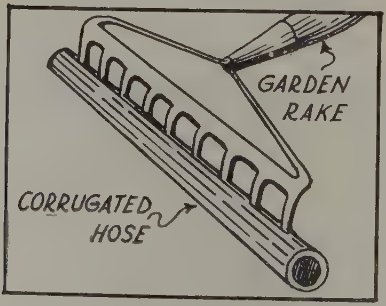


Plate 104.

A substantial squeegee for scraping a dairy floor after scrubbing may be made from a length of garden hose, which is impaled upon the teeth of a garden rake. Such a scraper will prove especially effective if hose having a corrugated surface is used. When worn off on one side, the hose may be turned.

The PIG FARM

Importance of Body Length in Pigs.

L. A. DOWNEY, H. D. A., Instructor in Pig Raising.

NOW that carcase appraisal has provided a definite measure of carcase quality in pigs, there is indisputable evidence of a general lack of body length in Australian pigs.

For a long time the leaders in the pig industry have stressed the necessity to select for body length, and breeders have attempted to secure this desirable feature in their pigs; in fact, most breeders thought their pigs had sufficient body length. However, since numbers of pigs have been measured under the carcase appraisal system during the past few years, it has been found that Australian pigs generally are too short.

Body length is not only an important characteristic from the point of view of the secondary side of the industry, but the producer also wants long pigs because they are usually more productive—long-bodied sows are usually better milkers, and that extra inch in the middle helps the weight when pigs are being sold.

Investigators have shown that pigs with bodies long in proportion to their weight also have the desirable light covering of back fat.

Body length in proportion to weight can be increased by growing the pigs slowly, but this practice is usually uneconomical, and as body length is an hereditary characteristic and is associated with the number of ribs in the pig, it is important that breeding stock should be selected for length of body either judged by appearance or by records of pigs of similar breeding whose carcases have been appraised.

The number of ribs in pigs varies from thirteen pairs to seventeen pairs, with most pigs having fourteen pairs or fifteen pairs. Such knowledge enables the breeder to have a wide field for selection of stock.

There has been a tendency to select stock with good hams and good heads. These are valuable features in the pig, but not nearly so important as body length, and in securing good heads and hams body length is usually lost. Breeders and judges of pigs might, therefore, with advantage place a lot more importance on selection for body length, even if something is lost in ham and head quality.

The ideal pig for the grower or the trade is a pig well balanced in all features, but body length has been lost, and it must be retrieved quickly if the industry is to flourish and find a ready market in the United Kingdom for the increasing imports from Australia. It therefore appears very difficult to place too much importance on body length of pigs, particularly when it is remembered that a light covering of back fat and light shoulders are usually associated with good body length.

In a recent pig carcase competition conducted by the Australian Meat Board, in which 114 pigs from most of the States of the Commonwealth were judged by carcase appraisal in London, 92 of the pigs were too fat, and only two pigs reached the required standard for body length. The average total marks gained by all the pigs in the competition were 67·83 per cent., but the average marks gained for body length were only 55·31 per cent. These values are not the opinion of any individual, but are facts, based on measurements, and therefore deserve the serious consideration of the Australian pig industry.

Pig-raisers in Queensland can secure the appraisal of their pigs through various carcase competitions, or by arrangement with the firms slaughtering their pigs. Full information on these services can be obtained from the Department of Agriculture and Stock.

Those pig breeders who fear that the pig which suits the meat trade will not suit the farmer may take solace in the knowledge that in Denmark, where pig improvement has been based on the results of careful testing for many years, there has been marked increase in body length, decrease in back fat, increase in streak thickness, decrease in food consumption per lb. of pork, and increase in rate of growth. These statements are based on the analysis of complete records on many thousands of Danish pigs of the Large White and Landrace breeds, and therefore indicate that similar improvement might be anticipated with other breeds of pigs, provided similar methods are adopted.

Pig recording is costly work, and involves the use of testing stations, but some useful work can be done at very little cost by growers recording the prolificacy of their sows the rate of growth of their pigs, and the carcase quality of their porkers and baconers.

WHEN SELLING PIGS.

Porkers should be marketed at an age and weight to suit export market conditions, as well as the local trade. Best trade weights, for prime conditioned pigs, range between 60 lb. and 90 lb. dressed (approximately 95 lb. to 139 lb. live weight). For local markets, the best range is 60 lb. to 80 lb. dressed weight (95 lb. to 130 lb. live weight). Porkers should be in good condition, free from bruises, whip marks, or other faults, and be protected from the effects of severe heat; otherwise, they will not dress out to advantage on slaughter. Lighter weights and very thin pigs are not profitable as porkers, and at factories and meatworks will only be paid for at valuation.

Bacon pigs for local markets should be 90 lb. to 130 lb. dressed weight (approximately 140 lb. to 185 lb. live weight), with added range to 160 lb. dressed weight (220 lb. live weight) at slightly lower rate per lb. dressed. For export, the range of weights varies from 120 lb. dressed weight (175 lb. live weight) to 160 lb. dressed weight (220 lb. live weight), but the heavier pigs should not carry too much fat; otherwise, they are subject to reduction in price or to rejection. For local markets also, there is a strict limitation to the percentage of fat, and factories prefer pigs in meaty condition with only a light covering of fat.

Sows for small goods trade should be in good condition, and should have weaned their litters two months or more before marketing; also, they should not be in pig any more than one month, if in pig at all. Sows close to farrowing and those farrowed recently are liable to condemnation at the factories. Poor brood sows and poor stags are useless and will not be accepted, while boar pigs are useless for meat purposes until castrated, and then well fed for approximately two months, the time depending on the progress made after the operation.

In every instance the greatest care should be taken to avoid bruising and damaging the pigs in transit, especially when loading and unloading. Pigs carted to country sidings for trucking or sale should not be fed immediately before despatch, as such feeding is conducive to heavier shrinkage and to digestive disorders in transit.

It is again emphasised that under the Queensland Pig Industry Act all pigs must be branded by the vendor before sale, barter, or exchange. Full information on any of these points is obtainable from the Department of Agriculture and Stock, Brisbane.

—*E. J. Shelton.*

PESTS OF THE PIGGERY.

At this season of the year pigs are frequently tormented by house flies, mosquitoes, and lice. This irritation can be allayed to a large extent by giving the pigs a daily dressing (only a very small quantity at each application) of oil to which a small quantity of disinfectant has been added.

The pig has a tough skin and often carries a coarse coat of hair, but despite that his health may suffer through parasitic infestation. Where the skin is lacerated or badly sunburnt and cracked, blowflies and house flies swarm around, becoming a source of risk to the animal's general health. Wounds resultant from castration and other operations are favourable places for attack by blowflies. Where there is considerable inflammation, painting the affected areas with a dilute solution of iodine will be helpful. Carbolised glycerine—or boro-glycerine—is an excellent dressing once the wounds have been thoroughly cleansed by washing and/or syringing out. Any treatment for reduction of irritation and inflammation and assistance in healing will be beneficial.

Prevention of attack is often difficult, but something might be attempted along these lines by eradicating breeding grounds like manure heaps where flies breed freely. Swampy areas encourage mosquitoes and sandflies, and neglected sties and pens and rubbish lying about harbour fleas and lice. A general clean-up along the lines of a spring cleaning is worth while.

—*E. J. Shelton.*

CARELESS BRANDING CONDEMNED.

Most pig raisers are now conscious of the necessity for branding pigs offered for sale. Where practicable, the body tattoo method of branding is now in fairly general use. However, there are cases where it is desired to identify live pigs on arrival at bacon factories or saleyards, and for this purpose body tattooing is not suitable; in the absence of a more satisfactory method of branding, the firebrand is used.

The firebranding system is open to abuse in the hands of a careless man, and pigs which have been injured through faulty branding are sometimes noticed at bacon factories and saleyards. Their carcases are so blemished as to lower their value to the trade. The most common mistakes in firebranding are the use of too large a brand, and its application for too long a period—thus causing a deep burn in the skin of the pig which becomes an ugly sore.

Pigs with blemishes caused through faulty branding are not required by the trade. It is frequently observed that exporting buyers at the Cannon Hill saleyards refuse to bid for badly-branded pigs. This, of course, reduces competition, and the blemished pigs are sold at a comparatively low price.

Where pigs must be firebranded, a small brand should be used; the pigs should be clean and dry, and the brand used very hot and applied lightly and quickly on the shoulder or neck.

—*E. J. Shelton.*

THE PADDOCK SYSTEM OF PIG-RAISING.

Farmers who have not already adopted the practice are advised to give careful consideration to the advantages of running pigs on the grazing system as compared with the intensive penning system which, until a few years ago, was the recognised practice of most pig-keepers.

There is little doubt that the old custom of confining pigs to small pens resulted from the desire to produce very fat carcases. Present-day buyers demand leaner pork and bacon; so it is necessary to alter pig-raising practice accordingly, especially in respect of breeding, feeding, and penning. Provided pigs are bred to the correct type—that is, pigs intended for light porkers bred from quick-maturing stock, and pigs intended for baconers bred from later-maturing stock—they may be kept under grazing conditions from birth until fit for slaughter with very good results. Pigs kept in paddocks throughout their lives have a tendency to grow rather than fatten, and it is the lean, growing pig, and not the fat pig, which is required for meat.

When grazed, pigs find a lot of their food in the form of pasture or forage crops specially grown in the pig paddocks, and these foods usually require less labour and are cheaper than other pig foods. The pigs not only do their own harvesting but also return a good amount of manurial matter to the soil, thus maintaining or improving soil fertility.

With the run of a good paddock containing some pasture or green crop, there is very little chance of pigs suffering from mineral or vitamin deficiency. This is a decided advantage over the intensive penning system, in which ill-health often results from a lack of knowledge or care in attempting to supply a complete diet. Penned pigs often suffer from dietetic disorders, and when turned out on pasture recover rapidly.

Under the intensive system, it is necessary to have buildings, floors, and drains well constructed in order to maintain a safe standard of hygiene. This also means extra labour and water for cleansing pens.

There is little, if any, difference in the costs of establishing a good paddock piggery and a good intensive piggery. One of the most important features of a paddock piggery is that the work of tending the pigs is much more congenial, for the only cleaning-up of the piggery consists of cultivating or resting the pig paddock and moving the sheds and troughs, which should be built on skids to allow of easy transport.

Probably the most practical method of controlling worm infestation in pigs is to run them in paddocks which can be cropped, fed off, and ploughed in rotation. This system and the use of moveable equipment is a very satisfactory method of pig-raising under Queensland conditions.

—*L. A. Downey.*

CORN COB CHARCOAL FOR PIGS.

A good use for the corn cobs (cores) that accumulate on most farms, and around piggeries, is to make charcoal of them. The cores are of little value as a food for pigs because of their coarse, dry fibre content, and even if the whole cob (grain and core) were ground, it is doubtful whether it would be worth the trouble.

After the pigs have chewed all the corn from the cob, the waste cores and husks may be raked together into a pile and burned. When the heap is a mass of red-hot coals water may be poured over the pile. The partially charred cores, when cold, may be gathered for the pigs. Bones should also be gathered and burned, and added to the charcoal made from the cores. This cleaning-up serves a double purpose—it gets rid of matter that would otherwise accumulate and become a nuisance, and provides charcoal and mineral matter for the pigs.

AGRICULTURAL REFORMS IN ENGLAND.

Speaking of the need for greater agricultural reforms, this is how one Englishman who is farming in a large way has put it in a note in the *Farmer and Stock Breeder*: Any proposed reforms themselves ''must assure that we keep in cultivation every single acre of land that can be made to produce a crop, and for stock-raising we must create conditions that will ensure that every stretch of pastoral land carries its live stock quota. But before we can pretend to begin practical reforms we are again face to face with the population problem. In my view this question of population dominates the whole issue. It is folly to lament the acres lost to the plough when we have not to-day the labour necessary to farm efficiently the present acreage.''

He, of course, was speaking during the recent crisis, when the maintenance of food supplies in the event of war was uppermost in the minds of many in England.

Here is another English farmer's viewpoint taken from the same source:—''To increase the acreage to be farmed would, under present conditions, only make matters worse. We must first create new conditions which will retain on the land an increasing proportion of the young men and women who are bred to country life but year by year drift to the towns to find a decent living. Like boxers, they never 'come back.' It is obvious that the conditions of country life must be sufficiently attractive to retain people permanently on the land. With all essentials guaranteed, we can safely trust to the land to hold its own against the town, for land work is healthier, more vital, and less monotonous than work in a factory. One obviously essential guarantee is a sufficient return to the farmer on the produce of his farm.''

Registered Hatcheries

Name and Address.	Name of Hatchery.	Breeds Kept.
G. Adler, Tinana	Nevertire	White Leghorns, Australorps, Rhode Island Reds, and Langshans
F. J. Akers, Eight Mile Plains	Elmsdale	White Leghorns and Australorps
J. Cameron, Oxley Central	Cameron's	Australorps and White Leghorns
M. H. Campbell, Albany Creek, Aspley	Mahaca Poultry Farm and Hatchery	White Leghorns and Australorps
J. L. Carrick & Son, Manly road, Tingalpa	Craigard	White Leghorns
N. Cooper, Zillmere road, Zillmere	Graceville	White Leghorns
R. B. Corbett, Woombye	Labrena	White Leghorns and Australorps
T. G. Crawford, Stratford	Rho-Isled	Rhode Island Reds
Rev. E. Eckert, Head street, Laidley	Laidley	Australorps, White Leghorns, and Langshans
Elks & Sudlow, Beerwah	Woodlands	Australorps and White Leghorns
W. H. Gibson, Manly road, Tingalpa	Gibson's	White Leghorns and Australorps
Gisler Bros., Wynnum	Gisler Bros.	White Leghorns
J. W. Grice, Loch Lomond	Quarrington	White Leghorns
C. & C. E. Gustafson, Tannymorel	Bellevue	Australorps and White Leghorns
J. McCulloch, Whites road, Manly	Hindes Stud Poultry Farm	White Leghorns, Australorps, and Brown Leghorns
A. Malvine, junr., The Gap, Ashgrove	Alva	White Leghorns and Australorps
H. L. Marshall, Kenmore	Stonehenge	White Leghorns and Australorps
W. J. Martin, Pullenvale	Pennington	Australorps, White Leghorns, and Langshans
J. A. Miller, Racecourse road, Charters Towers	Hillview	White Leghorns
F. S. Morrison, Kenmore	Dunglass	Australorps, Brown Leghorns, and White Leghorns
Mrs. H. I. Mottram, Ibis avenue, Deagon	Kenwood Electric Hatcheries	White Leghorns
J. W. Moule, Kureen	Kureen	White Leghorns and Australorps
E. K. Pennefather, Oxley Central	..	Australorps and White Leghorns
G. Pitt, Box 132, Bundaberg	Pitt's Poultry Breeding Farm	White Leghorns, Australorps, Langshans, Rhode Island Reds, and Brown Leghorns

Name and Address.	Name of Hatchery.	Breeds Kept.
C. L. Schlencker, Handford road, Zillmere	Windyridge ..	White Leghorns
T. Smith, Isis Junction	Fairview ..	White Leghorns and Langshans
T. A. Springall, Progress street, Tingalpa	Springfield ..	White Leghorns
W. J. B. Tonkin, Parkhurst, North Rockhampton	Tonkin's Poultry Farm	White Leghorns and Australorps
T. Westerman, Handford road, Zillmere	Zillmere ..	Australorps and White Leghorns
P. A. Wright, Laidley ..	Chillowdeane ..	Brown Leghorns, White Leghorns and Australorps
R. H. Young, Box 18, P.O., Babinda	Reg. Young's ..	White Leghorns, Brown Leghorns and Australorps

NEW REGISTRATIONS.

Following is a list of those who have applied for the registration of their hatcheries up to the 25th January, 1939:—

Name and Address.	Name of Hatchery.	Breeds Kept.
Dixon Bros., Wondecla ..	Dixon Bros. ..	White Leghorns
G. Grice, Loch Lomond ..	Kiama ..	White Leghorns
P. Haseman, Stanley terrace, Taringa	Black and White	Australorps and White Leghorns
H. W. & C. E. E. Olsen, Marmor	Squaredeal Poultry Farm	White Leghorns, Australorps, Black Leghorns, Brown Leghorns, and Anconas
S. V. Norup, Beaudesert road, Cooper's Plains	Norup's ..	White Leghorns and Australorps
A. C. Pearce, Marlborough ..	Marlborough Stud Poultry Farm	Australorps, Rhode Island Reds, Light Sussex, White Wyandottes, Langshans, Khaki Campbell and Indian Runner Ducks, and Bronzewing Turkeys
W. A. Watson, Box 365, P.O., Cairns	Hillview ..	White Leghorns
Dr. W. Crosse, Musgrave road, Sunnybank	Brundholme ..	White Leghorns, Australorps, and Rhode Island Reds
D. J. Murphy, Ferndale, Marmor	Ferndale ..	White Leghorns, Brown Leghorns, Australorps, Silver Campines, and Light Sussex

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REDUCE FEEDING COSTS.

J. J. McLACHLAN, Poultry Inspector.

EVERY effort should be made to reduce production costs to a minimum. On many farms this is being done, but on many more feeding costs are excessive.

The actual costs of foodstuffs is governed by supply and demand; therefore no material saving can be made at this point. Any change in the present ration fed is of doubtful value, because such a change may result in lowering the egg yield. Again, it is doubtful whether any substitute for the existing rations would be economical.

This only leaves the actual practice or management of feeding open to question. Summed up, the cost of production is governed to a great extent by the food consumed and the wastage. Any reduction in food consumption is followed by a reduction in egg production, therefore feeding costs cannot be reduced by feeding less food.

Food wastage is an appreciable factor in feeding costs. This applies, irrespective of the actual cost of foodstuffs, and is applicable to dry mash, wet mash, and grain feeding. By far the greatest wastage is occurring in the dry-mash system of feeding. This fact has been pointed out to many farmers who have immediately remedied the fault; nevertheless a great amount of wastage is still taking place.

Faultily constructed hoppers are the cause of nearly all the wastage that occurs with the dry-mash system. There are many different designs of dry mash hoppers, and a plan of a suitable hopper can be obtained free on application to the Department of Agriculture and Stock, William street, Brisbane. This hopper embodies other essential features, in addition to minimising wastage. The most important thing about any feed hopper is the feeding trough, which should permit ample space for the birds to eat, at the same time preventing any of the mash being wasted.

The hopper referred to embraces these features within certain limits. It also permits the mash to fall freely. It must be understood, however, that some mashes will run or feed more freely than others. Therefore, no one hopper will prevent different grades of mash overfilling the trough and allowing the mash to be readily scratched out. The hopper recommended has a lath along the front of the trough, and in the event of the mash running too freely and permitting wastage this lath can be shifted to reduce the space. This hopper is easily and cheaply constructed.

Quite recently one poultry farmer installed several of this class of hopper, and he stated that although production was maintained at the same level, the hoppers brought about a saving in food costs of approximately £4 per week. Some time ago another farmer installed similar hoppers and reduced feeding costs from 5 bags to 3 bags of laying mash each week. These two illustrations should be sufficient to demonstrate that wastage can be prevented. In the latter instance quoted, the farmer was confident that no wastage existed on his farm.

To ascertain if wastage is taking place, a rough estimate may be obtained by looking up the purchases of foodstuffs for the previous month or a longer period. As the birds consume approximately equal quantities of mash and grain, the quantities (by weight) purchased should be approximately the same. In the event of the quantity of ingredients for a mash exceeding the quantity of grain purchased, it indicates that the excess quantity is being wasted.

A more accurate method is to count the number of birds in one shed, then empty the hopper, refill it and record the weight of mash supplied; the period which the mash lasts will indicate the true position, as each bird will consume on an average 2 oz. of mash daily. For example, 100 birds supplied with 100 lb. of mash will consume it in eight days; if it only lasted six days each bird would be wasting 4 oz. weekly; if it lasted seven days there would be a wastage of 2 oz. per bird weekly. Such a small wastage as outlined, of 2 oz. per bird weekly, does not appear to be of great importance, but with a flock of 1,000 birds this would amount to 6,500 lb. in a year and would cost about £35, based on present feeding costs.

Existing high costs of all poultry foodstuffs make it essential for every poultry farmer to eliminate wastage. By putting into practice the advice offered, wastage will be minimised and the margin of profit increased.

POULTRY MANAGEMENT.

The maintenance of the flocks in a condition of good health largely depends on two factors:—(1) stock of sound constitutional vigour, and (2) sanitary surroundings.

Only healthy laying and breeding stock possessing an abundance of constitutional vigour should be kept. The removal of birds from the flock at the first sign of debility or sickness is a necessary precaution against loss.

Since the welfare of the healthy members of the flock is of far greater importance than that of a few sick birds, it is important to look after the healthy birds first. Sick birds should be culled out of the flock. The poultry house can then be cleaned and disinfected. All feeding and drinking utensils should be thoroughly washed.

If treatment of sick birds is advisable they should be kept confined while under treatment. Birds suffering from a contagious disease should be quarantined until all danger of contaminating the rest of the flock is over. In many cases of disease it is better to kill the affected birds at once, and burn or bury them deeply. In no case should diseased birds be sold.

Sanitation is a very important factor in keeping down disease in poultry flocks. The land used for poultry should be kept free from contamination by regular cultivation and the growing of grass, or some other kind of crop. Some poultry-men lime their soil annually. It is, of course, necessary to keep poultry houses clean and well littered with clean, dry straw. Houses to be kept free from dampness need good ventilation but draughts should be avoided. Overcrowding tends to weaken the vitality of the stock, and careful poultrymen allow three or four square feet of floor space to each bird. Poultry houses should be disinfected thoroughly at frequent intervals. If disinfectants are used, the fowls should not be marketed until the odour of the disinfectant has completely gone. If poultry are to be marketed shortly after disinfecting the premises, the house may be best disinfected with a 4 per cent. solution of formaldehyde. Disinfection will be most effective if the floors, walls, and roosts are first cleaned thoroughly.

The culling of laying flocks has been practised for a number of years in practically all parts of the country, and, as a result, the laying qualities of the flocks have greatly improved. Culling has also led to a better distribution of the marketing of surplus hens. While the practice of culling the laying stock is designed to eliminate the poor layers, sometimes there is a tendency to market hens in unthrifty condition or in poor health, a practice which cannot be too emphatically condemned. Only the slip-shod farmer will market hens in poor flesh, and it obviously pays to select stock carefully before marketing.

—*P. Rumball.*

AUTUMN HATCHING.

The term autumn hatching is usually applied to incubation practised during February, March, and April.

Many poultry raisers may be considering the advisability of autumn hatching during the coming year because of the shortage in the number of chickens raised during the past hatching season. Before adopting this practice, consideration should be given to the financial returns that may be expected from autumn-hatched stock.

Most of our commercial breeds reach maturity within six months; consequently, chickens hatched during the autumn come into production during August, September, or October. Egg prices at this period of the year are usually around about 1s. per dozen gross, for first-quality eggs. Pullets, however, do not produce a first-grade egg with respect to size, and there is a tendency for autumn-hatched chickens to lay eggs of a smaller size than if the birds were hatched during the winter and spring of the year. Consequently, the demand for autumn-hatched stock during the glut period will not equal that for stock hatched in the usual season. In addition, during that period of the year when eggs vary in value from 1s. to 1s. 9d. per dozen, autumn-hatched stock will be growing and not producing.

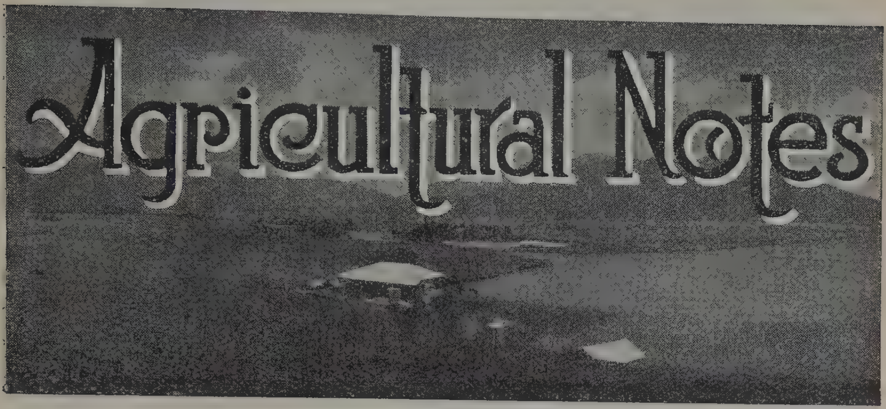
It may be claimed that the autumn-hatched stock will produce eggs in plenty during late summer when egg values are fairly high, the birds moulting late. This cannot be depended upon, for many moult at the usual period.

With the relatively good prices for table poultry—and it is reasonable to assume that good prices will be obtainable for table poultry during the winter of 1939—some justification may exist for the raising of birds that are for table purposes only. This, however, is dependent on the value of fodders. In experiments at the Animal Health Station, it has been ascertained that the following quantities of fodder are required to raise cockerels to the various stages of development:—

Age.	White Leghorns.		Australorps.		Light Sussex.	
	Bird's Weight In oz.	Food Consumption for Period in oz.	Bird's Weight in ox.	Food Consumption for Period in oz.	Bird's Weight in oz.	Food Consumption for Period in oz.
Day-old ..	1·3	..	1·36	..	1·23	..
3 weeks ..	5·31	9·80	5·84	9·9	6·59	10·17
6 weeks ..	12·92	32·8	15·86	34·61	17·03	30·34
8 weeks ..	21·4	54·74	27·5	63·61	27·2	62·74
12 weeks ..	34·7	116·92	49·1	140·39	47·3	144·84
16 weeks ..	47·8	180·01	72·4	226·49	70·4	245·84
18 weeks ..	51·1	215·86	85·0	277·88	83·6	288·94
21 weeks ..	..	..	98·7	358·83	96·8	403·54

The poultry raiser who contemplates hatching poultry for table purposes during autumn should carefully consider the prospects of profitable engagement in this business by calculating the costs from this table, having due regard for the market value of fodder.

—*P. Rumball.*



Rhodes Grass as a Hay Crop.

WHILE the value of Rhodes grass as pasture is well recognised in Queensland, its usefulness as a hay crop is little appreciated. Not only could fodder reserves be built up on the farm or station by conserving surplus Rhodes grass pasturage as hay, but, in some circumstances, sowing down of special areas to Rhodes grass for hay would be sound agricultural practice.

The cutting of hay from grassed country will be restricted, necessarily, to cleared land with a fairly even surface, and is practicable only in seasons of abundant growth. When seasonal conditions are such that a surplus of grass is indicated at an early date, the paddocks which can be mown should be closed to all stock and permitted to develop to the hay stage, when the crop may be harvested. In normal seasons, if the cutting is made during summer, the grass will recover quickly.

Apart from lucerne, the main summer-grown hay crops (e.g., Sudan grass and millets) are annuals. Cropping with annuals has the very obvious disadvantages of high cost of production and of exposing soils to erosive influences, particularly storm waters. A perennial or long-lived hay grass costs little to maintain, prevents erosion, improves the texture of the soil, and adds materially to its organic content. Although it is not suggested that Sudan grass and millets should be abandoned as hay crops in favour of Rhodes grass, farmers and pastoralists might well give consideration to the testing of Rhodes grass for hay purposes.

Because of its susceptibility to injury by heavy frosts, Rhodes grass is, however, not likely to prove more useful than a rotation of annuals in the colder regions of the State, such as parts of the Darling Downs.

In the drier localities in which Rhodes grass is grown largely, the hay is easily cured. In most cases it should be in the stack within forty-eight hours of cutting. The yield varies, of course, with seasonal and soil conditions, but on fertile soils young stands should provide at least two cuttings a year, each of 1½ to 2 tons of hay to the acre. The quality of the hay, particularly its palatability, is somewhat variable, but all classes of stock will eat it without much waste.

—C. W. Winders.

THE VALUE OF ANIMAL MANURE.

The unused dung of farm animals in Queensland must represent a great loss of national wealth each year. On almost every dairy farm one can see this waste from the freshly voided piles round the milking yards to last year's undisturbed cake lying bleached and useless in the field.

Idle dung is not only idle money, it is wasted money. About four-fifths of the food consumed by farm animals is excreted, and the fertilizing constituents of this manure are equal pound for pound to the best obtainable.

The urine soaks into the earth and soon makes its nutrients available to the plant roots, but the dung lies on the surface and if left unbroken may take years to decompose.

The direct results of this condition are readily observed. A definite area is temporarily spoiled for grazing, and when eventually grass grows around or through the heap it is completely ignored by stock until there is nothing else left. By this time it has aged, become harsh, and lost much of its nutritive value.

The indirect results are not usually recognised. Rats and other vehicles of disease revel in droppings and transfer any infection to feed bins, troughs, and stored foods.

These disadvantages can not only be eliminated, but, by using a proper system of conservation and distribution, be converted to profit.

The material which accumulates in sties and stalls or where animals congregate can be readily collected and tipped into a nearby excavation. The excavated earth can be banked to form a run-off. A covering of palings, old posts, sheets of iron or other suitable material should be used to avoid trouble to stock and inconvenience to farm workers. Manure stored and covered in this way loses little of its fertilizing value. Manure piled in the open and exposed to the weather loses much by fermentation and leaching.

When land is to be manured the pit can be opened and the material removed.

Where the paddocks are large and the droppings widely distributed a system of conservation is not practicable. In such cases periodic visits should be made with a rake and the dung under shade trees, around watering places, or along "pads" broken up and scattered. This allows the material to dry quickly and continuous tramping by stock soon works it into the soil.

The benefits derived from farm manure are twofold. It supplies plant nutrients as well as an excellent medium for the production of humus—the organic water-conserving colloid of soil.

The daily production of dung per 1,000 lb. live weight is approximately—

Cow	52 lb.
Horse	40 lb.
Pig	50 lb.

This means that on a farm running 35 cows, 4 horses, and 4 sows, there would be a weekly production of 6 tons. If only one-third of this could be collected it represents at least 100 tons of good fertilizer each year.

PARA GRASS—USEFUL IN DAMP SITUATIONS.

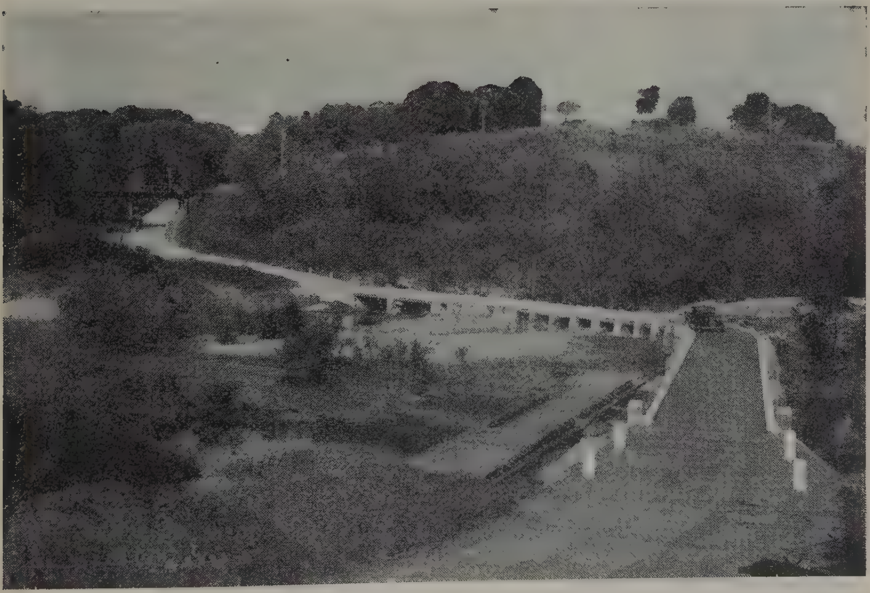
Para grass—known in Queensland also as *Panicum muticum* and giant couch—is grown to a large extent in many tropical and subtropical countries. The grass is a rapidly-growing perennial, spreading by means of thick runners which grow along the ground and root at the joints. Vertical shoots are produced at the joints and reach a height of up to 5 feet. The runners spread very quickly, and the area occupied by the grass rapidly increases in size as the mat of foliage is produced.

Stock are fond of both leaves and succulent stems, but the trampling of animals may injure the runners, and under some conditions it is advisable to cut the grass and feed it green rather than graze it heavily. The feeding value of Para grass is fairly good.

Para grass has proved very useful on our coastal country. In North Queensland, it has established a good reputation and is widely grown. It grows best on moist or even swampy land, and a paddock on a wet portion of any coastal farm might well be planted with Para grass to provide a change of diet from paspalum. Heavy frosts cut the grass back rather severely, but recovery in spring is rapid.

Seed of Para grass is usually of poor quality; hence the planting of roots or stem cuttings is the usual method of setting out the grass. These may be planted on ploughed land in furrows or started by mattocking in on the edges of waterholes or damp patches. Roots may be purchased in most of the coastal districts. A small number of cuttings will multiply rapidly in warm, showery weather.

—*C. W. Winders.*



[*Photo.: Lands Department.*

Plate 105.

On the Road to the Atherton Tableland.—The new bridge across the Barron River at Kuranda, North Queensland.

Horticultural
Notes

The Control of Banana Thrips Rust.

RECENT investigations have revealed that rust in bananas, caused by the banana thrips, can be effectively controlled in Southern Queensland at a cost compatible with the economics of the industry, provided that the price obtained for the fruit is maintained at a reasonable level.

Three measures may be recommended, differing in their cost and degree of efficiency, but all giving commercial control if properly applied.

1. *Dusting.*—A nicotine dust is applied to the bunch at weekly intervals for from ten to twelve weeks, starting as soon as possible after the bunch is thrown. The application is made lightly but evenly, from all angles, and with a fair pressure to ensure proper penetration between fingers throughout the bunch. Particular attention should be paid to top hands, especially in bunches which are inclined to be choked. The dusting must be thorough, though it is not necessary to "whitewash" the bunch.

2. *Cloaking and Dusting.*—A piece of hessian or other bagging material, large enough to completely envelop it, is wrapped round the bunch and secured at the top. The nicotine dust is applied at the bottom and the open side at fortnightly intervals during the life of the bunch.

3. *Bagging and Dusting.*—A bag made of good-quality sugar hessian and measuring at least 27 inches wide by 45 inches deep is placed over the bunch as soon as possible after it is thrown, and securely fastened at the top. The nicotine dust is applied through a small hole at the bottom of the bag at fortnightly intervals during the life of the bunch, or, alternatively, at weekly intervals for a month after the bag is placed in position.

In dusting cloaked or bagged bunches the covering is not removed, as it tends to retain the dust within the bunch and thus increase the effect of the nicotine.

In all cases, for the first two or three treatments the bunch stalk from the top hand back to the throat of the plant should be dusted. Also, it is advisable to remove the bracts as soon as they become detached and to snap off the flower end at the same time, especially in bagged bunches.

Growers are warned against removing the bags or cloaks a few days before cutting in order to darken the colour of the fruit. Sun-scalding will inevitably result. No objections have been raised in the past to the slightly paler colour of the fruit from bagged bunches.

The dust must be of good quality. It should be of the light, floating type, and not the heavy, settling type, and have a nicotine content not less than 2 per cent. Various types of dust guns are available. The more expensive ones are undoubtedly the most efficient, but cheaper makes have been found more suitable. In most cases it will be necessary to cut down the normal flow of dust. Dusting while the bunches are wet should be avoided as far as possible. No serious trouble should be experienced with a dust residue if careful attention is paid to these details.

Growers are advised that most of the insecticidal dusts available have been thoroughly tested, but none has fulfilled the general requirements as well as the nicotine dusts.

The time to apply control measures against rust varies with different plantations, and in different seasons, but generally the period ranges from December to April. A periodical examination of bunches of all ages during November and December will indicate quite clearly to growers when they should be tackling this problem.

Of the three measures outlined, bagging and dusting undoubtedly gives the best control of rust. Furthermore, this method obviates almost entirely the somewhat serious inconvenience caused to the operator by the floating clouds of dust, which are unavoidable when dusting alone is being done. Bags have numerous other beneficial effects. There is little difference between cloaking and dusting and dusting alone as a rust-control measure, but cloaking has many of the incidental advantages of bagging.

Bagging and dusting is the most expensive method, and dusting alone the cheapest, a careful estimate suggesting a probable annual cost of £12 and £4 per acre respectively. The cost of cloaking and dusting would lie between the other two, but obviously would depend largely on the price of the material used for the cloaks.

The keynote to success in rust control is thoroughness. Delay in treating the young bunch, by whatever method, is fatal, while slipshod dusting may reduce the efficiency of control to such a low level that the operation is a waste of time and money.

As an accessory factor in thrips control, it is important to have the plantation in first-class cultural condition. A healthy, vigorous plant will produce a bunch thrown well out, with hands well spaced on the bunch stalk, and with the individual fingers widely separated. Such bunches tend to develop rust much less severely and are much easier to treat than the choked and compressed bunches thrown by unthrifty plants.

The Significance of Bronze Orange Bug Outbreaks.

IN coastal areas, the bronze orange bug has recently been more numerous than for some years past. The crop will, of course, be reduced and the twig injury may give the trees a decided set back. Control is relatively simple if given adequate consideration by the grower.

The essential facts in bug behaviour and their significance in the control programme are as follows:—

(1) Outbreaks rarely occur suddenly; they are the sequel to a gradual increase in the bug population over a period of years; an increase which is quite apparent to any grower who personally works among his trees.

(2) Overwintering takes place on citrus trees in a young nymphal stage. Adults and the later-stage nymphs, which are so destructive in summer, are absent in late autumn and winter.

(3) No spray which can be safely applied to citrus trees gives a complete kill of the adults and later-stage nymphs, but a very effective spray is available to destroy the overwintering stage. This stage can be attacked most suitably late in March or early in April when spraying programmes for scale insect control are in full swing.

The appropriate bug spray contains 10 lb. resin, 3 lb. caustic soda, 1½ lb. fish oil per vat of 40 gallons. It can be prepared on the orchard without any great difficulty if the instructions, supplied on request to the Department of Agriculture and Stock, are followed. A soft soap compounded to the above formula is now on the market, however, and many growers will doubtless prefer to prepare the spray from this soap, which is merely dissolved in hot water and then diluted with the required amount of cold water to the proper strength. The resin-caustic soda-fish oil spray entails no more trouble in its preparation from the soft soap than an oil spray or a soap-soda wash, with both of which the grower is familiar. It is also a general purpose spray, toxic alike to the commoner scale insects in coastal districts and the overwintering nymphs of the bronze orange bug.

The bug control problem does not involve additional work for the orchardist. Normally a scalicide, sometimes an oil spray, sometimes a soap-soda wash, is applied to citrus trees on the coast in late March or early April. Resin-caustic soda-fish oil is quite an efficient scalicide, and at the same time deals with any existing bug problem. In these circumstances, the grower merely substitutes the resin-caustic soda-fish oil for the spray which he would normally use in his March-April spray programme.

In view of the importance of the bronze orange bug in coastal orchards at the present time, the resin-caustic soda-fish oil spray should be extensively used next autumn. Otherwise, current losses may be repeated or even accentuated in the 1939-40 season.

PREPARATION OF LAND FOR DECIDUOUS FRUIT TREES.

If a man about to plant an orchard were asked for how long he expected it to be a profitably investment, he would probably reply, "For the rest of my life." That being so—and an orchard can and should last a lifetime—it is obvious that too much care cannot be bestowed on the preparation of the land for the reception of the trees; but it is surprising to find that in some cases the land actually receives less preparation than it would for a quickly-planted row of cabbages.

Trees badly planted in ill-prepared ground cannot thrive, and to attempt to establish an orchard under such conditions is really a waste of time and money. There have been cases in which growers have planted the trees, and then tried to finish "the preparation" of the land afterwards. This cannot be done satisfactorily, and the grower would have been better off in the long run had he deferred his planting for a year.

There is nothing so unsatisfactory as working an unthrifty orchard. On the other hand, nothing in the working life of the orchardist gives more pleasure and satisfaction, or is so interesting, as caring for and harvesting the profit of trees that do well, and respond to good treatment.

In the preparation of the land subsoiling is desirable, although not absolutely necessary, provided the land can be, and is, ploughed to a sufficient depth. Should there, however, be a hard pan under the surface soil then subsoiling is necessary; for, if it is not done, the trees may suffer severly from "wet feet."

A disc plough is, generally, the most satisfactory implement to use; and, if it is not set to cut too wide a furrow, it can be made to plough 18 inches deep.

When preparing land for fruit trees, care should be taken to remove, as far as possible, all roots and stumps, even though they be below plough depth, in order to prevent, or at least to reduce to a minimum, the risk of attack by the root fungus *armillaria mellea* which, although primarily one of nature's scavengers and feeds on dead roots, yet it can —and so often does—leave the decaying roots and fasten on to the live roots of fruit trees with disastrous results. It is almost impossible to save the tree once the fungus has become firmly established.

—*H. St. J. Pratt.*

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PROPPING BANANAS.

Loss of promising and superior fruit as the result of uprooting and breaking down caused during cyclonic weather in the Mons Marie variety shows the necessity for a system of propping that will reduce loss to an absolute minimum.

The method giving the best results is double propping, and it is carried out as follows:—Two stakes, 2 inches by 2 inches and approximately 12 feet long, are tied together about 1 foot from the end, and the tie wire left about 2 feet in length.

The two stakes are opened and the small fork or crotch formed by the union of the two stakes is placed at the correct height on the plant, and the length of wire is drawn round the stem and joined on the props:

When the two legs are firmly placed, and with the aid of the wire tie, it will be apparent that the plant will withstand a great amount of buffeting from the weather.

It is wise to place the props in position as soon as the plants have bunched, as it is noted that at this stage quite a large number are affected.

Another advantage of this method is that the bunch hangs between the two props, thus practically eliminating damage through rubbing.

For Cavendish bananas this method is just as practical, as the one-stake system causes an appreciable loss through rubbing, but for this variety the length may be reduced to 9 feet.

—*J. H. Mitchell.*

TRANSPLANTING TOMATOES.

When tomatoes are transplanted during summer, considerable loss is often caused by the young plants "burning off" at ground level. This is particularly noticeable where the soil is fine or sandy.

A dull day should be chosen for transplanting, but if the area is large and transplanting cannot be postponed, it should be done late in the day. Roll the stem of each plant in paper just before planting. This is best done by having a sufficient supply of papers cut to a suitable size—for the average size plant, about 4 inches by 1½ inches. The papers may be threaded on a string and suspended from the belt of the field worker for convenience in use. On taking a plant from the carrying-box or basket, the paper is snapped off the string and rolled round the stem of the plant—like rolling a cigarette—leaving only the top leaves and the root exposed. The plant may then be placed in the ground in the usual way. It will be found that after a little practice very little extra time will be required for this method of planting. Other advantages of this method are that the young plant does not readily droop, and soon becomes established. Where cutworms are troublesome, it also will give a good measure of control during the early stages of growth.

—*A. M. Richardson.*

WASHING OF SOIL IN ORCHARDS.

Surface drainage should be studied before laying out an orchard. In established orchards where it is found that surface wash and scouring is occurring, much can be done to prevent it. All surface water from above the orchard may be diverted by making a wide, shallow contour drain on the top side of the orchard, where the ground may be grassed. With a plough and scoop, this drain can be made usually at a very small cost. Depth and width will be determined by the volume of water to be diverted, but a drain about 4 feet wide and 18 inches deep, with the soil scooped on to the lower side, will do in most cases. This type of drain will not scour nor silt up readily, and if well grassed will need very little attention.

It should be remembered that a fall of 18 inches in every 100 feet is the correct grade for surface contour drains in a cultivated area.

To reduce loss of soil by the action of heavy rains on the cultivated area, the planting of suitable cover crops should receive attention.

If it is not intended or desired to plant cover crops, it should be remembered that badly cultivated land with a hard pan near the surface will wash more severely than if good cultiation has been the rule.

Where the ploughing has been left in the rough it will be found that each furrow will carry its own water, whereas a final cross-ploughing tends to back the water up until it forcibly breaks through at a low point, generally causing a big run and considerable damage.

—*H. St. J. Pratt.*

RESOILING RAIN-WASHED ORCHARD LAND.

Repairing the damage caused by the recent heavy rains scouring gutters through the orchard is an operation requiring considerable thought, if the work is to be permanent. A repetition of the occurrence is inevitable where the work has been done haphazardly.

Land denuded of the surface soil presents a hard surface with which the replaced soil will not readily combine. Realisation of this important fact is one of the essentials of a successful job.

Whatever method is employed to repair the damage by replacing soil, it is of the greatest importance that the exposed hard areas should be treated first. Where practicable, the subsoil plough is the best implement to use, but any strong-toothed implement which will break up the surface will serve the purpose. Besides assisting in drainage, this will allow the overburden of replaced soil to incorporate with the subsoil.

If, however, repairing the damaged area entails very much labour, it may be advisable to commence resoiling at the higher levels first. If this is not done, and heavy rain interrupts the work, the undiverted water may again flow down the gutters and carry away the replaced soil on the lower portions.

For general purposes, and where soil can be taken from land adjacent to the orchard, a scoop should be used. Unless it is very soft, the ground should be ploughed before scooping, and careful ploughing to an even depth will greatly facilitate scooping.

—*A. M. Richardson.*

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The Fruit Market.

JAS. H. GREGORY, Instructor in Fruit Packing.

PROSPECTS of a satisfactory market for early green vegetables are promising. Fruit prices for the month have been satisfactory. The Brisbane market has remained steady throughout for Stanthorpe fruits. Green classes of apples became increasingly hard to clear. Stanthorpe growers should make every effort to maintain the price of apples at payable levels by keeping immature fruit off the market, particularly Jonathan and Granny Smith varieties. There will be no competition with Stanthorpe Jonathans by Victorian growers this season, as the absence of rain has reduced the size, quality, and quantity of supplies. In many Victorian districts a heavy drop is being experienced. Queensland pineapples are being sent to Southern markets in green condition to the detriment of prices. The question can still be asked: "When will many of these so-called experienced growers realise that there is no continued profitable sale on any market for immature fruit?" The development of the trade in Queensland fruits on Southern markets is continually being retarded by this type of grower. Queensland has a monopoly of production which only requires sound development to be worth while. The development of a taste for papaws, pineapples, bananas, and mangoes is being handicapped all the time by this short-sighted policy.

Prices:—

Bananas.

Brisbane.—Cavendish: Sixes, 6s. 6d. to 12s. 6d.; sevens, 10s. to 14s. 6d.; eights, 11s. to 15s.; nines, 13s. to 16s.

Sydney.—Cavendish: Sixes, 16s. to 18s.; sevens, 17s. to 20s.; eights and nines, 20s. to 24s.

Melbourne.—Cavendish: Sixes, 14s. to 17s.; sevens, 16s. to 19s.; eights and nines, 18s. to 21s.

Brisbane.—Lady's Finger, 2d. to 11d. per dozen.

The heat wave during the second week of January caused a falling off in demand, retailers in many cases selling boiled fruit in an endeavour to avoid loss, so reducing the public demand.

Adelaide.—Supplies were light; prices, 20s. to 28s.

Pineapples.

Brisbane.—Smooths, cases locals, 3s. to 7s.; Northern, 6s. to 8s.; 2s. to 5s. dozen; Ripleys, 1s. 6d. to 4s. dozen.

Sydney.—Southern Queensland consignments containing much inferior fruit selling 3s. to 8s.; Northern fruit, 7s. to 15s. Some green lines hard of sale.

Melbourne.—Southern Queensland, 8s. to 12s.; Bowen, 10s. to 16s.

Action has been taken by the inspectors, some lines being condemned for immaturity.

Papaws.

Brisbane.—Locals, 2s. to 4s. bushel case; Yarwun, 5s. to 9s. tropical case.

Sydney.—7s. to 11s.

Melbourne.—12s. to 16s. tropical case.

Mangoes.

Brisbane.—Locals, 3s. to 7s.; Fancy Varieties, 8s. to 11s. per bushel.

Sydney.—12s. to 16s. per bushel.

Melbourne.—12s. to 15s. per bushel.

CITRUS FRUITS.

Lemons.

Brisbane.—Locals, 7s. to 12s. per bushel; Gayndah, 14s. to 16s. per bushel.

Melbourne.—17s. to 20s. per bushel.

Oranges.

Brisbane.—Imported, N.S.W., 12s. to 14s. per bushel.

DECIDUOUS FRUITS.

Apples.

Brisbane.—Gravenstein, 9s. to 12s.; well-coloured, 13s. to 14s.

Pears.

Brisbane.—Williams, 6s. to 10s.; Clapps, 3s. to 7s.

Plums.

Brisbane.—Burbank, 3s. to 6s.; Diamonds, 3s. to 5s.; N.S.W. Angelinas, 7s. to 10s.

Peaches.

Brisbane.—Elbertas and Wiggins, 5s. to 7s.; others 2s. 6d. to 6s.

Nectarines.

Brisbane.—3s. to 8s. half bushel.

OTHER FRUITS.

Passions.

Brisbane.—Choice, 5s. to 6s.; others, 2s. to 5s.

Tomatoes.

Brisbane.—Ripe, 3s. to 8s.; Green, 3s. to 5s.; Coloured, 5s. to 9s. half bushel.

Sydney.—Stanthorpe, 5s. to 8s. half bushel.

Grapes.

Brisbane.—White Varieties, Local 3d. to 4d. per lb.; Black, 3d. to 3½d. per lb; Cominya, 5s. 6d. to 7s. half bushel; Roma, 5s. to 7s.; Choice Muscats to 8s. per half bushel.

VEGETABLES.

Beans.

Brisbane.—10s. to 14s. bag; poor lines, 3s. to 4s.

Melbourne.—30s. to 50s. a 50-lb. bag.

Peas.

Brisbane.—8s. to 13s. bag.

Melbourne.—20s. to 30s. a 50-lb. bag.

Cabbages.

Brisbane.—8s. to 12s. bag; Specials higher.

Melbourne.—6s. to 12s. dozen for South Australian.

Beet.

Brisbane.—3d. to 10d. per bundle.

Melbourne.—3s. to 4s. 6d. dozen bundles.

Carrots.

Brisbane.—6d. to 1s. 3d. per bundle.

Melbourne.—3s. to 5s. 6d. dozen bundles.

Parsnips.

Melbourne.—2s. 6d. to 4s. 6d. dozen bundles.

Lettuce.

Brisbane.—2s. to 3s. 6d. dozen.

Melbourne.—6s. to 11s. per case.

Marrows.

Brisbane.—1s. to 4s. dozen.

Melbourne.—7s. to 12s. dozen.

Pumpkins.

Melbourne.—20s. to 22s. bag.

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SCRAPER PROTECTOR.

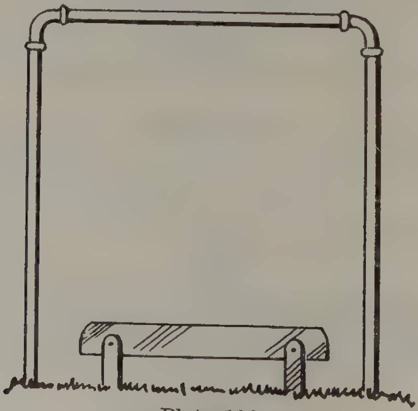

Plate 106.

There is no chance for anyone to stumble over this shoe scraper—a waist-high protector which may be grasped by the one using it to maintain a balance. It is made of three lengths of ½-inch gas pipe and two elbows. Two of the lengths are set upright in concrete at either end of the scraper. The third piece of pipe joined to the upper end of the uprights by elbows forms a crossbar at a height of about 40 inches.—*The New Zealand Farmer.*

PRODUCTION RECORDING.

List of cows and heifers officially tested by Officers of the Department of Agriculture and Stock which have qualified for entry into the Advanced Register of the Herd Books of the Australian Illawarra Shorthorn Society, Jersey Cattle Society, Aryshire Cattle Society, production charts for which were compiled during the month of December, 1938 (273 days unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
	AUSTRALIAN ILLAWARRA SHORTHORNS.			
	JUNIOR, 2 YEARS (STANDARD 230 LB.).			
Sunnyview Mabel 3rd	N. L. Siemon, Beaudesert	9,633·77	332·916	Burradale Byron
College Miss Rascal	N. L. Siemon, Beaudesert	7,411·49	313·479	Trevlac General
	SENIOR, 2 YEARS (STANDARD 250 LB.).			
Rhodesview Nancy 19th	W. Gierke and Sons, Rhodesview, Helidon	9,128·51	349·603	Blacklands Prospector
Villa Maria Broady 17th	W. Hinrichsen, Clifton	6,375·75	320·295	Cedargrove Monarch
Rhodesview Fanny 25th	W. Gierke and Sons, Rhodesview, Helidon	8,124·03	316·407	Blacklands Prospector
Ashstead Pearlie	H. Seiler, Redbank, Creek, Gatton	7,683·18	263·581	Mountain Home Blossom's Royal
	JUNIOR, 3 YEARS (STANDARD 270 LB.)			
Ashstead Rosette	H. Seiler, Redbank Creek, Gatton	7,713·34	286·727	Greyleigh Debenture
	SENIOR, 3 YEARS (STANDARD 290 LB.)			
Navillus Violet 3rd	C. O'Sullivan, Navillus, Ascot, Greenmount	7,852·85	313·594	Park View Mars
	JERSEY.			
	JUNIOR, 2 YEARS (STANDARD 230 LB.).			
College Verbena	Queensland Agricultural High School and College, Lawes	5,453·39	281·224	Peggy 9th Duke of Belgonia
Balwyn Golden Love 2nd	H. G. McKnight, Balwyn, Gowrie Junction	4,804·4	281·157	Carnation Victoradio
	SENIOR, 2 YEARS (STANDARD 250 LB.)			
Grange Vale Yvonne	T. Gillespie, Ravenshoe	5,502·5	286·345	Banyule Supremacy
Maiden Fern of Colmdale	G. Schroder, Warra	5,549·15	270·951	Grassmere Floss 20th Twylish
	JUNIOR, 3 YEARS (STANDARD 270 LB.)			
Retford's Hope of Hamilton	J. Wilton, Junr., Raceview	5,339·3	344·478	Retford May's Victor
	SENIOR, 3 YEAR TANDARD 290 LB.)			
Grange Vale Pansy	T. Gillespie, Ravenshoe	6,809·3	344·237	Eclipse of Brooklodge
	AYRSHIRE.			
	MATURE COW (STANDARD 350 LB.)			
Fairview Vesta	R. M. Anderson, Southbrook	10,856·14	528·614	Longlands Connie Willie 2nd
Myola Opal	R. M. Anderson, Southbrook	10,841·87	418·497	Fairview Bonnie Willie

General Notes

Staff Changes and Appointments.

Mr. G. K. L. Clark (Esk) has been appointed an inspector under the Diseases in Stock Acts, the Slaughtering Act, and the Dairy Produce Acts, Department of Agriculture and Stock.

The following transfers of officers of the Department of Agriculture and Stock have been approved:—

Mr. C. S. Clydesdale, Senior Instructor in Agriculture, from Mackay to Toowoomba;

Mr. N. E. Goodchild, Senior Instructor in Agriculture, from the Bureau of Tropical Agriculture, South Johnstone, to Mackay;

Mr. W. Dixon, Stock, Slaughtering, and Dairy Inspector, from Cloncurry to Southport;

Mr. M. Custance, Stock, Slaughtering, and Dairy Inspector, from Southport to Ipswich.

Mr. F. Caine, District Inspector of Stock, will be attached to Cloncurry.

Mr. D. A. Bacon, Inspector of Stock, Slaughterhouses, and Dairies, Mareeba, has been appointed also an inspector under the Brands Acts.

Mr. H. J. Bradshaw, Clerk of Petty Sessions, Nanango, has been appointed also an acting inspector of stock at Nanango.

Mr. C. L. Waller, Court House, Cairns, has been appointed chairman of the Babinda and Hambledon Local Sugar Cane Prices Boards, and also an agent of the Central Sugar Cane Prices Board for the purpose of making inquiries in regard to sales and leases of assigned lands.

Messrs. S. F. Robson (Canungra), P. Lentz (Binna Burra), L. W. Kollmar (Springbrook), and F. J. Taylor (North Tamborine) have been appointed honorary protectors under the Fauna Protection Act, and honorary rangers under the Native Plants Protection Act, respectively.

Messrs. E. J. Brewer and E. W. Graham (Sarina) and R. Long (Gympie) have been appointed honorary protectors under the Fauna Protection Act.

Mr. R. A. Tarrant, Instructor in Agriculture, Department of Agriculture and Stock, will be transferred from Brisbane to Bundaberg, and Mr. W. R. Straughan, Instructor in Agriculture, from Miriam Vale to Gympie.

Constables P. Costello (Rosedale), J. R. Hamilton (Proston), and D. G. Mouatt (Kajabbi) have been appointed also inspectors under the Slaughtering Act.

Mr. R. J. Brunton, Spring Creek, Killarney, has been appointed an honorary protector under the Fauna Protection Act and an honorary ranger under the Native Plants Protection Act.

Messrs. F. S. James and J. Brown (Rockhampton) have been appointed honorary protectors under "*The Fauna Protection Act of* 1937."

Mr. C. G. Warrian, of Glenvale Orchard, Southport, has been appointed an honorary protector under the Fauna Protection Act, and an honorary ranger under the Native Plants Protection Act.

Wild Life Preservation.

Two Orders in Council have been issued under "*The Fauna Protection Act of* 1937" declaring as sanctuaries for the protection of fauna an area embracing the summit of Mount Glorious and the head of Cedar Creek and its tributaries; and the Stanley River Catchment and Mr. J. K. McConnel's property at Mount Brisbane.

Honey Board Levy.

The Honey Board Levy Regulations issued in April, 1934, and extended in September, 1936, have been further extended for the period from 9th March, 1939, to 8th March, 1944. They empower the Honey Board to make a levy on growers of honey and beeswax at the rate of 1½ per cent. on all honey and beeswax sold to provide for the administrative expenses of the Honey Board.

Plywood and Veneer Boards.

Regulations have been issued under the Primary Producers' Organisation and Marketing Acts, empowering the Plywood and Veneer Board, and the Northern Plywood and Veneer Board, respectively, to make levies on pine plywood. Such levies to be used in establishing and maintaining a fund for the purpose of subsidising growers for plywood despatched to destinations beyond the Commonwealth of Australia, or at the option of each Board, in establishing a joint fund contributed by both the Plywood and Veneer Board and the Northern Plywood and Veneer Board for the purpose of subsidising growers of any of the commodities, respectively, controlled by them for plywood despatched beyond the Commonwealth.

The levy, in each case, will be at the following rates:—

(*a*) On plywood three-sixteenths of an inch or less in thickness, at such rate not exceeding one halfpenny per hundred feet face measurement as the respective boards may from time to time determine;

(*b*) On plywood of a greater thickness than three-sixteenths of an inch, at the rate per hundred feet face measurement which bears the same proportion to the rate of levy for the time being determined by the respective boards under paragraph (*a*) above as the thickness of the plywood bears to three-sixteenths of an inch.

Banana Industry Protection Board.

The Regulations under the Banana Industry Protection Acts have been amended to provide that meetings of the Banana Industry Protection Board shall be held once in every three months instead of monthly as at present.

Mr. E. R. Ashburn, Instructor in Agriculture, Department of Agriculture and Stock, has been transferred from Bowen to Monto.

Constable W. O. J. Powell, Stonehenge, has been appointed also an inspector under the Brands Acts.

Veterinary Medicines.

Following on the passing of the Veterinary Medicines Act Amendment Act last Session, all Regulations hitherto in force under the Veterinary Medicines Act have been revoked, and new Regulations embodying the necessary alterations to give effect to the provisions of the amending Act have been issued in lieu thereof. These provide for the licensing of dealers in veterinary medicines, for the registration and analyses of veterinary medicines, and the procedure of business at meetings of the Veterinary Medicines Board.

Mr. F. B. Coleman and Mr. R. A. Taylor, of the Department of Agriculture and Stock, have been appointed Registrar of Veterinary Medicines and Deputy Registrar of Veterinary Medicines, respectively.

Egg Board Levy.

The Egg Board Levy Regulations issued in April, 1929, and extended in May, 1934, have been further extended for the period from 1st January, 1939, to 31st December, 1941. The Regulations empower the Egg Board to make a levy at the rate of ½d. per dozen eggs on all persons delivering eggs to the Board. The proceeds from the levy are used for administrative purposes.

Levy for Innisfail District Canegrowers' Executive.

Regulations have been issued under the Primary Producers' Organisation and Marketing Acts empowering the Innisfail District Cane Growers' Executive to make a levy of ½d. per ton on all cane harvested in its district for the 1938 sugar season, the proceeds therefrom to be used for administrative purposes of the Innisfail District Executive.

Dairy Products Stabilisation Board.

An Order in Council has been issued under "*The Dairy Products Stabilisation Acts*, 1933 *to* 1936," constituting the fourth Dairy Products Stabilisation Board and appointing as the members thereof, for the period from 1st February, 1939, to 31st January, 1942, the undermentioned members of the Butter and Cheese Boards:—

Messrs. W. J. Sloan (Malanda), R. M. Hill (Bororen), J. McRobert (Maryborough), J. Purcell (Toowoomba), T. F. Plunkett (Beaudesert), and A. G. Muller (Fassifern Valley, Kalbar) (Butter Board); D. G. O'Shea (Southbrook), T. Dare (Narko), and R. C. Duncan (Pittsworth) (Cheese Board); and Mr. R. Wilson (Acting Director of Marketing).

Answers to Correspondents

BOTANY.

Replies selected from the outgoing mail of the Assistant Government Botanist, Mr. W. D. Francis.

Plants from Maryborough Named.

W.G.M.F. (Maryborough West)—

1. A 3-pronged spear grass, *Aristida* sp. It belongs to a large group of grasses widely spread in Queensland. They are often called "wire-grasses," and are generally regarded as having little or no value as fodder, except perhaps in their very young stages.
2. A sedge, *Cyperus gracilis.* The difference between sedges, grasses, and allied plants you will find given in *Botany for Queensland Farmers.* On the whole, sedges are not generally regarded as having the same fodder value as grasses.
3. Broad-leaf carpet grass, *Axonopus compressus.* This grass is very widely spread in Queensland and is sometimes called "Buffalo Couch." There has been a good deal of controversy about it in the Press of recent years. Though it has some value for second-class country, many dairymen are afraid it will encroach on better-class paspalum country, and seriously depreciate the carrying capacity of the land.
4. Small shivering grass or quaking grass, *Briza minor,* a native of Europe, now widely spread, either cultivated or naturalised, in most temperate countries.
5. Kangaroo grass, *Themeda australis.* Leaves only, and determination therefore doubtful. It may be *Cymbopogon refractus,* barb wire grass. Please send seed-heads to verify.
6. *Sporobolus diander,* a native grass for which we have not heard a common name.
7. Seed-heads required.
8. Large shivering grass or quaking grass, *Briza maxima.*
9. Buffalo grass, *Stenotaphrum secundatum.* No seed-heads; please send later on to verify.
10. Paspalum, *Paspalum dilatatum.* See No. 9.
11. Mullumbimby couch, *Cyperus brevifolia,* a sedge. See No. 2. For the determinations of the sedges in your collections, we are indebted to Mr. S. T. Blake, Walter and Eliza Hall Fellow in Economic Botany at the Queensland University, a botanist who is monographing the Australian sedges.
12. Crow's foot grass, *Eleusine indica.* A very common grass, widely spread over the warm-temperate and sub-tropical regions of the world. Like sorghum and some other fodders, it contains a prussic acid yielding glucoside. Apart from this, it seems to be quite a good fodder.
13. Common couch, *Cynodon dactylon.*
14. A star or windmill grass, *Chloris divaricata.* These grasses represent a group very common in Queensland pastures, making, on the whole, good bottom feed for stock. They are of particular value in sheep country.
15. Prairie grass, *Bromus unioloides.* A valuable grass during winter and spring months.
16. Rat's tail grass or Parramatta grass, *Sporobolus Berteroanus.* This grass has caused some concern in different places, particularly in over-stocked country, as it takes possession of bare patches, and is of very little value as a fodder.
17. A Love grass, *Eragrostis sororia.* The Love grasses represent a large group very common in the mixed native pasture. Although not particularly valuable themselves, they are of some importance in making up the mixture in the general native or wild pasture.

We will always be very pleased to name any specimens you care to send. The usual method is to number each specimen and retain a duplicate.

Blue Weed or Paterson's Curse.

W.H. (Pampas)—

The specimen is the blue weed or Paterson's curse, *Echium plantagineum*, a native of Southern Europe, now a common naturalised weed in Australia. It is much more abundant in the Southern States than in Queensland, and is a very bad pest of the wheatfields. In the wheatgrowing areas of South Australia it is known as "Salvation Jane." It has been established in Queensland for a number of years, but does not seem to have spread to any great extent. This year we have received more specimens than usual.

Guinea Grass.

W.G.B. (Toowong)—

The specimen is Guinea grass, *Panicum maximum*, a very valuable grass for tropical and sub-tropical countries. Several varieties have been introduced by the Department of Agriculture and Stock, and some of these seem rather better than the ordinary type. A particularly good one is that known as "green panic" (var. *trichoglume*).

The typical form of Guinea grass is a very palatable and valuable grass, particularly for periodical cutting and feeding-off. One of the reasons, probably, that it has not been grown more extensively in Queensland is because of the fact that fertile seed is hard to keep. Although the plants may spread naturally from seed, the keeping capacity is very short.

Whitewood.

J.B. (Jandowae)—

The specimen is the Whitewood, *Atalaya hemiglauca*, a tree with a wide distribution in Queensland, New South Wales, and parts of Northern Australia. It is quite a handsome tree in flower, and later on the flowers are followed by winged seed-capsules. In the southern parts of the State, it is generally regarded as an excellent fodder tree. In the inland north-west, the form that grows there is said to be the principal cause of "walkabout" in horses. In the southern parts of the State, and in New South Wales, it has, apparently, never caused trouble in any way.

Vetches.

N.F.W. (Severnlea)—

The two plants sent are vetches, which are leguminous plants allied to the broad bean. The larger-leaved plant is the common vetch, *Vicia sativa.* The smaller-leaved one is the hairy vetch, *Vicia hirsuta.* Both grow in the winter and spring.

Native Tamarind.

S.D. (Babinda)—

The specimen is the Native Tamarind, *Diploglottis diphyllostigia*, a tree confined to Northern Queensland. We have two other species of the genus in South Queensland, one with a yellow fleshy covering of the seeds and the other with a red covering, similar to the one you send, and both are sometimes used for making drinks. They are too acid to use straight out as fruits, but are not known to posses any poisonous or harmful properties whatsoever.

In spite of the extreme acidity of the fruits, we have known pigs to be very fond of them. The northern one you send is, if anything, more acid than the southern forms. It is in no way related to the true tamarind, commonly cultivated in North Queensland. It is, however, very closely allied to the lee-chee and longan, favourite Chinese fruits, sometimes cultivated here, but more often seen dried in Chinese shops.

Barklya, a Beautiful Native Tree.

R.A.C. (Miriam Vale)—

The specimen is *Barklya syringifolia*, a beautiful native tree. The only local name we have heard applied to is "golden shower," a name, however, belonging much more correctly to a different tree. The generic name Barklya is short enough for general use. It commemorates Sir Henry Barkly, an early Governor of Victoria.

Mayweed. Cape Cotton.

C.V.H.C. (Esk, Brisbane Valley)—

The specimens have been determined as follows:—

1. The plant with white, daisy-like flowers and a yellow centre is *Anthemis Cotula*, mayweed or dog fennel. It has been reputed poisonous to stock, but cattle very rarely eat it in any quantity. If poisonous at all, it is certainly only mildly so, and in ordinary circumstances cattle do not eat it in sufficient quantities to cause trouble.
2. *Gomphocarpus fruticosus*, Cape cotton or bladder cotton, a native of South Africa but now a naturalised weed in Queensland and New South Wales. Recent feeding tests at the Animal Health Station, Yeerongpilly, have proved the plant poisonous to stock. Generally, however, stock do not normally eat it in any quantity, except in a very dry time when attracted to it by extreme hunger. It is sometimes fostered in gardens on account of its peculiar appearance, but is potentially a very troublesome weed.

Saffron Thistle.

D.J. (Kilkivan)—

The specimen is the saffron thistle or false star thistle, *Carthamus lanatus*, a native of the Mediterranean region. It is now a great pest in parts of Australia, particularly in the Southern States. It has been established in Queensland for some years, but does not seem to be quite so aggressive here as elsewhere. It always, however, has the possibility of becoming a very bad weed, and on this account should be destroyed.

In spite of its very thorny nature, it has been spoken of at odd times, particularly in the Riverina (New South Wales), as being quite readily eaten by sheep before it gets to the hard, woody stage. A grazier in South Australia states that he had mown a large quantity of this weed, and, later on, stock took very readily to it. We think, however, that this is only making the best of a rather very poor plant.

Rye.

M.J.M. (Goomburra)—

The specimen is rye, *Secale cereale*, much cultivated as a grain crop on the Continent, particularly in Germany and northern France. In Great Britain it is grown to a very limited extent for grain, but very largely for a green feed and hay crop for stock. It is very rarely seen in Queensland. An odd plant or two, however, is occasionally seen, either as a stray or about vacant allotments.

If you want to try it, seed should be sown preferably during autumn, say in May. Much the same conditions apply to it as to wheat.

Sour Grass.

H.N.H. (Cooroy)—

The specimen is *Paspalum conjugatum*, commonly known in Queensland as sour grass or yellow grass. In the Philippine Islands it is commonly known as mission grass or hula grass. It is very widely spread over the tropical regions of the world, and has been established in North Queensland for a number of years. It has travelled south recently, and is now found in various places in Northern New South Wales and along the North Coast Line between Brisbane and Gympie.

Wherever this grass grows it seems to have a very poor reputation as a fodder. It has obtained a very strong hold on some dairy farms in the wetter parts of the Atherton Tableland, and is regarded in much the same way as carpet grass is on the Blackall Range and other places. In the Hawaiian Islands and elsewhere the grass seems to have the same poor reputation as a fodder. It is very common in New Guinea, particularly in coconut and rubber plantations, and we have seen working mules feeding on it extensively . On the whole, however, it apparently has very little value as a dairying grass.

Italian Millet.

D.T.A. (South Johnstone)—

The specimen is *Setaria italica*, Italian Millet. This grass is widely distributed over the warm and temperate regions of the world. It has a good reputation as a fodder grass, and is suitable for silage. It is both palatable and nutritious, and is a summer-growing annual.

Notes on Grasses.

Inquirer (Murgon)—

As a general rule we do not give diagrams and sketches of grasses, but the following notes on those you ask about may be of interest:—

Couch Grass.—The common Couch Grass is *Cynodon Dactylon*, a grass very widely spread over the warmer regions of the world. It has a wide distribution in Queensland. Outside of Australia it is perhaps best known as doub grass. It is a very nutritious and palatable grass, but does not provide a great bulk of forage.

Rhodes Grass.—This is *Chloris Gayana*, a native of South Africa, now cultivated in many countries. It is one of the most important grass introductions into Australia, particularly Queensland.

Pigeon Grass.—A name given to different species of *setaria*. The commonest in Queensland is probably *Setaria glauca*. This grass has a wide distribution over the warm temperate regions of the world. In Queensland it frequents rather wet pastures. It is also found as a weed of cultivation. It is quite a good fodder. The grains of some species of *setaria* or pigeon grass are eaten by the natives in different parts of the world.

Windmill Grass.—A name applied to various species of *chloris*. *Chloris* is a large group of grasses which contains Rhodes grass and a number of native species. Most of the native species are quite good fodder for stock, particularly for sheep, making a good bottom bite.

Rat's Tail Grass (*Sporobolus elongatus*).—This grass has a very wide distribution in Queensland, and is generally regarded as inferior as a fodder.

Summer Grass (*Digitaria marginata*).—This grass is widely spread throughout the tropics and subtropics of the world. It is a very common weed of cultivation in Queensland, and is found from the coast to the far interior. When a constituent of ordinary pasture it mostly grows on sandy land. It is generally regarded as quite good fodder for stock.

Paddock Love Grass (*Eragrostis leptostachya*).—This grass has a wide distribution in the State. The love grasses, though in themselves of only secondary value, are useful members of the mixed native pasture.

Stink Grass (*Eragrostis cilianensis*).—This grass is a native of Southern and Central Europe, but is now widely spread as a weed in most temperate and sub-tropical countries. It is very common in Queensland, and is mostly met with as a weed of cultivation. The leaves are provided with glands along the edges which give forth a peculiar although not altogether unpleasant odour. Generally it is not eaten by stock, although sometimes it is said that plough horses eat it greedily when working in fields in which it predominates.

Prairie Grass (*Bromus unioloides*).—A native of North America now cultivated or naturalised in most warm temperate countries. It is an important winter grass in Queensland.

Forest Blue Grass (*Bothriochloa intermedia*).—This grass has a very wide distribution in Queensland, and in some places is the most important constituent of the mixed native pasture.

Kikuyu Grass (*Pennisetum clandestinum*).—A native of Africa now cultivated extensively in many warm temperate and sub-tropical countries.

Bunch Spear Grass (*Heteropogon contortus*).—This grass has a wide distribution along the Queensland coast. In its young stages it is quite a palatable and nutritious grass; later it becomes harsh and lacking in nutritive value. The name bunch spear grass comes from the fact that the "seeds" become gathered together in bunches because of their long awns.

Paspalum (*Paspalum dilatatum*).—This is one of the most generally cultivated grasses along the whole of the coastal belt. It is a native of Southern Brazil and the Argentine, but is now widely cultivated in sub-tropical countries.

Bitter Blue Grass (*Bothriochloa decipiens*).—A very common grass with a wide distribution in Australia. It is particularly abundant in over-stocked pastures on the coast and north coast because of the more palatable species having been eaten out. Stock will eat it, of course, when forced on to it in the absence of other feed. In the Southern States, particularly in Victoria, it has been found that the grass becomes more palatable and the pasture better if during the autumn clover is sown down with about 1 cwt. of superphosphate per acre.

Rural Topics

Dairy Practice in Germany.

From a recent European tour a member of a party of New Zealand farmers brought home with him a fund of new information on dairy practice in Germany, where high dairy standards have been attained. There every acre of grass land is used. Even the railway and canal embankments are cropped for grass hay, or grazed by tethered milkers. Ordinary dairy farm land is subdivided into small paddocks. The cattle, arranged in groups according to yield, are allowed to graze on the different plots in turn. The cows yielding the most milk have the first bite of the fresh grass, then the second best or less milk productive group follows the first lot until, finally, the young dry stock and horses are put on to eat out what is left. Then the plot is rested for about a month, and when the grass is long enough again the process is repeated. Every small paddock is managed in the same way, so that the process of rotational grazing is continuous.

By dividing the land available into a large number of plots (four, eight, or twelve, according to the size of the farm) it is possible to let the fresh-milking cows always have a newly-grown pasture and plenty of feed. By this method the German farmer is able to increase his grass crop by manuring the plots after they have been grazed down.

The German dairy farmer is always aiming to increase the quality as well as the quantity of milk produced. The primary aim is to obtain milk in its purest possible condition. Pure milk can only be obtained from clean animals. Animals are kept clean by washing, brushing, and appropriate general care.

Realising the importance of such care, the German cattle breeding societies provide for the proper training of dairy workers. Sons of farmers and dairy hands are trained in schools for milkers. The principles of animal nutrition and the general care of farm stock is included in the course of instruction. The fact that the price of milk is based on quality is a direct incentive for the continuance and efficiency of these schools.

Improvement in the breeding, feeding, and keeping conditions of farm animals is a primary task of German agriculture. The German bull breeding law and laws relating to compulsory milk control and the improvement in quality and quantity of home-grown fodder are all embodied in German agricultural policy.

Calf Feeding.—A device by which calves are fed their milk ration on German dairy farms is simplicity itself. Each calf is allotted its own bucket—a shallow pail with one segment extended like a lug and in which a handgrip is cut. A rubber teat is allowed to float in the milk. This the calf seizes in its mouth and sucks in very much the same way as straws are used in a milk bar. The calf gets its drink in a natural way without waste or sloppiness. Each, of course, is fed in a separate bail.

Teams of Trained Milkers.—On the larger German farms milking is done by a trained team who do nothing else throughout the year than to milk the cows, feed them, and keep things clean.

By paying farm hands wages according to the output per animal per day, milkers are encouraged to obtain as high a yield of milk as possible. It is taken for granted that the compulsory test for the whole herd of cows—a regulation which has now been in force in Germany for two years—has been properly carried out by the farmer. Testing of the whole herd—which is carried out with, perhaps, the greatest thoroughness in Denmark and Holland—has gradually spread in Germany, where, two years ago, the Government decided to compel all owners of cows to register and control the milk yield of their animals.

The purpose of this yield control becomes most evident by the fact that the total output of milk of a number of cows fed and kept in the same way increases so that the net profit of a farm also increases. At the same time the quality control raises the general standard of cattle breeding in Germany because it demonstrates to the farmer the necessity of better feeding and care of dairy stock.

Milk Testing.—The German milk law prescribes that at every milking the first jet of milk from each teat must be tested. This is done in a very simple way. The milker catches the stream of milk in the palm of his hand and scrutinises its appearance. The use of black basins for this work is of greater advantage and more practical. Clotted matter is more easily and accurately observed against the dark surface of the black basin, serving to avert infection and to prevent "wet milking," which is prohibited. The use of the indicator paper helps the observer to recognise the symptoms of sickness in the udder before these are seen in the changed appearance of the milk. The presence of disease is shown by a sudden change in colour of the indicator paper, easily noticeable by even untrained persons, and enabling them to judge of the state of health of the udder. Sick animals and those suspected of being so much be separated from the cows in sound health, which, of course, are milked first.

In the Milking Bail.—In Germany milking is done mostly by hand. Cow-tail holders protect the milker against being brushed by the cow's tail and also the milk from being soiled by it. To reduce the germ contents, the first jets of milk containing these are milked from every udder into a special first-milk receptacle. In order to prevent the milker's hands from being soiled and infected by contact with the milking stool, and also to allow him comfortably and quickly to adapt himself to the movements of restless animals, the milker has the one-legged stool buckled round him. The receptacle for the milk is an open, oval-shaped milking bucket of tinned sheet plate, with thigh rests. This, however, is being gradually superseded by a covered bucket with an opening for receiving the milk flow. The use of this bucket has proved effective in protecting the milk against disease and germs. A handgrip is placed on the outside of the bucket near the bottom so as to avoid soiling hands when emptying the bucket.

How do you Milk your Cows?

During an investigation among milkers in the Old Country to discover the possibilities of applying the principles of industrial psychology to farming, it was found that nine important points of temperament were needed in a good milker. Here they are with their respective values:—

	Per cent.
Conscientiousness	15
Patience	12
Perseverance	7
Determination	7
Attentiveness	7
Steadiness while at work	7
Punctuality	6
Cheerfulness	4
Talkativeness	2
Love of the work	13
General intelligence	20
	100

Women milkers were found to be more patient but more talkative than men; also they were considered more cheerful than men, but not more so than boys.

The rate of milking cows by different milkers is also very interesting. At this investigation it was found that the mean rate of milking with three test milkers was 1.4, 1.2, and 1 lb. a minute for the morning milking, and 1.25, 1, and 0.9 lb. a minute, respectively, for the afternoon milking.

In practice, it was claimed that an experienced dairy hand will milk about seven 2-gallon cows an hour without much trouble, and a really good milker will do nine.

Variety in Livestock Feeding.

The flesh-forming materials in foods (proteins) are composed of units termed "amino acids." The amino acids are synthesised by plants, but it is very doubtful whether they can be "manufactured" by vertebrates.

The most useful proteins are those which contain the greatest variety of amino acids. For this reason, animal by-products—milk, eggs, flesh, &c.—stand alone. If a vegetarian diet is to be persisted with, it must be selected from a wide range of foods so that the missing amino acids in one material way may be made up from another. This explains the benefits of variety in livestock feeding.

Valuable Pig Foods.

Skim milk and buttermilk—they should not be mixed with wash water—are of equal feeding value. These dairy products supply all the protein necessary to balance the carbohydrate content of the grain portion of the pig's ration. Together with lucerne, rape, barley, or other green feed—which may be either grazed or fed in the pig pen—they form an excellent ration.

High Lights of the Science Congress.

For the man on the land there were many highlights in the Science Congress at Canberra—many challenging addresses and many brilliant discussions. Sir John Russell, Director of the Rothamstead Agricultural Experiment Station, in England, who is so well known to many Queenslanders, helped the Congress in taking a keenly practical turn by a striking address on soil erosion.

The problem of soil erosion is viewed by both the scientist and the farmer so seriously that a close study of its causes and means of preventing it is now being made.

A survey of soil resources of the Empire, each Dominion making its own investigations, as a first step towards a comprehensive plan of organisation, adjustment, and development was advocated by Sir John Russell. He went on to say that "in the first place, there is the difficulty that prices in world markets vary radically, but there is the more serious danger that the production of one class of crop will lead to the permanent destruction of the soil. The production of wheat exclusively in large areas of Canada and the United States—also in Australia to some extent—has led directly to the destruction of many thousands of acres of good soil by erosion.

The economic importance of opossums and other native animals was emphasised by Professor Dakin, who said that only recently it had been discovered that the rapid killing-off of opossums was the cause of mistletoe getting out of control in Australian forests. The necessity of more adequate national reservations of native fauna and flora also was strongly stressed.

Another highlight of the congress was a discussion on the atmosphere as a source of raw material. The earth's atmosphere is now the subject of intense study by scientists, on whom rests the obligation of educating public opinion in the preservation of natural resources and the maintenance of the balance of nature. The stabilising forces of things within the earth and above the earth and which influence water and food supply requires intelligent study from every angle.

A Wool Substitute.

In his lecture to the Science Congress on modern developments in the industrial world, Professor Denham, of New Zealand, said that there is little doubt that before many years a synthetic fibre, possessing the crimp and elasticity of wool, will be on the market.

The March of Science.

In the course of its sittings for seven days the Congress revealed an immense amount of knowledge of the world about us which to most of us was unexpected and amazing.

We were told something about a new gas—xenon. This gas is very rare, yet in the future it may be exploited to an immeasurable degree by man.

We were let into the secret of what X-ray reveals about proteins. We were told how bromine is recovered from sea water to make the anti-knock motor spirits now sold at every motor service station. And we heard all about the new bearing metal which has the remarkable property of smoking when the lubricating oil gives out, thus supplying an automatic danger signal.

Men of science from many countries told fascinating stories of what the research laboratories of other nations are doing to adapt and direct the resources of nature to man's immediate needs. Sir John Russell, for instance, described how, at his experiment station, in England, the Australian farmer is being helped to replace chemical deficiencies in the soil, and so make twenty blades of grass grow where only one grew before.

To the layman many of these things were astonishing and some almost incredible.

Forest Scouts.

The appalling forest fires in Victoria have aroused the sympathy of all of us with those who have suffered. At one time or another we have all had to fight bush fires, and we know what it means. Here is an idea from Canada for forest fire prevention. Over there they have a volunteer youth movement, organised eight years ago, to help the regular forest rangers in fire prevention. Already an "army" of 10,000 "junior forest wardens" has been enrolled, and it is of great assistance in saving timber reserves from being burnt out. Incidentally, any carelessness in the use of fire anywhere during a dry spell should not be tolerated.

The Green Leaf—The Essential of Life.

Long before man inhabited the earth the atmosphere was foul with carbonic acid gases, so poisonous that a few inhalations of them would destroy life. Gigantic ferns, mosses, and reeds grew with extraordinary rapidity, and by absorbing these noxious gases consolidated them into leaves, stems, and branches, which in the course of long ages grew and decayed, and they changed into coal beds under the earth.

In this wonderful way two great results were accomplished—the atmosphere was purified and made fit for the breathing of man and animals, and vast stores of fuel were laid up for the use of future generations. What the green leaf did for the primeval world the green leaves of our woods and fields are continually doing for our atmosphere to-day.

Without them carbonic acid gases would accumulate to such an extent that animal life would be impossible.

There would not be any gay blossoms to delight our senses; for flowers are as pure breathers as man himself, and cannot exist in a foul atmosphere. Nor have we only the green leaves of our fields and woods to thank for this blessing; the air that we breathe has been purified for us, hundreds of miles away, by the palms of the Pacific, the pines of Europe, the fir trees of America, and the gum trees of Australia. Nothing is more wonderful in Nature than the balance which is kept up between the animals that contaminate the air and the plants that purify it—the refuse of one kingdom being the food of the other. If only 10 per cent. of carbonic acid gas accumulated in the atmosphere it would destroy every animal that breathes it. Out of a much smaller proportion than this the leaf builds up the mass of vegetation which covers the surface of the earth, whilst by the same act it restores to man and animal a healthy and pure atmosphere.

The green leaf, by retaining the constituents of sunlight, is the source of all life of the world. By its agency alone inert organic matter is changed into vegetation which is the starting point of all life.

Nowhere else in the world does this important process take place. The green leaf alone conserves and creates—everything else consumes or destroys. The quiet sunbeam, working by the most delicate and wonderful of chemical reactions in the leaf itself, has created for us our food and fuel.

The green leaf is the best conductor of electricity. To guard our homes from its destruction we erect lightning rods which drain the clouds or receive the discharge and bear it harmlessly to earth. But ages before Franklin pointed the first lightning rod to the storm, Nature had surrounded the dwellings of man with a protection far more effectual than this; for since the creation of organic life every pointed leaf and blade of grass has been silently disarming the clouds of their destructive weapon. A twig covered with leaves, sharpened by Nature's exquisite workmanship, is said to be three times as effectual as the metallic points of the best constructed rod. And when we reflect how many thousands of these vegetable points every large tree directs towards the sky, and consider what must be the efficacy of a single forest with its innumerable leaves, or a single meadow with its countless blades of grass, we see how abundant the protection from the storm is, and with what care Providence has guarded us from the destructive force.

In addition to these wonderful functions, the green leaf is also the source of all the streams and rivers in the world. It is by the agency of the leaf that water circulates as the life-blood of the globe. In the leafless world there would be no rains and no streams. Destroy the woods and you destroy the balance of Nature; you prevent the formation of clouds, you dry up the rivers, and you produce an arid desert; whereas, on the other hand, foster the growth of leaves and they will alter the nature of the climate, and change the wilderness into a fruitful field.

The green leaf is the type upon which the forms of all life are moulded. All the parts of a plant are but modifications of the leaf. The stem is a leaf rolled up tight; the blossom is a leaf transfigured for a higher purpose; the fruit is a leaf changed into a receptacle for the seed; and the seed itself is a leaf packed together in a case to protect it from unfavourable weather, and furnished with a sufficient amount of food for its unfolding and growth into a new plant in more favourable circumstances.

Take a pea or a bean, and if you strip off its envelope or skin, you find that it consists of a short joint and a pair of leaves; as it grows in the ground another joint with its pair of leaves is formed; and then another joint with its pair of leaves is formed, and so on. The whole stem consists of a mere repetition of these single elements—joints and leaves. And as all the vegetable kingdom is thus built up of leaves, so the animal kingdom is constructed on the same model.

All organisms, whether animal or vegetable, are similar in their elementary structure and form; and the most complicated results are obtained by the simplest conceivable means, and that without the slightest violation of the original plan of Nature. The palms of the human form are both constructed upon the model of the leaf. The whole earth is but a gigantic leaf in which the rivers and streams resemble the veins, and the mountains and plains the green parts.

Forestry is a fast declining art. The old ditchers and hedgers fully understood the importance of vegetation and trees. They only removed the surplus growth, allowing to remain all that was necessary for disease prevention. The sooner the hedger's and forester's art is revived in the agricultural community the sooner shall we have healthy soil, healthy stock, and healthy vegetation.

Green leaves are not the inert things many people believe them to be. Without them there would be no life. The crust of the earth was once a burnt cinder; and the reason why it has not continued so, why, unlike the moon which revolves around the earth, a great lifeless desert of solid lava, it has been peopled with all kinds of living things, is owing to the ministry of the green leaf.

—DR. W. E. WESSELS (Vancouver, B.C.), in *The Jersey Bulletin*, and reprinted from *The New Zealand Farmer*.

Renewal of Federal Grant for Vocational Training of Unemployed Youths.

In view of the announcement that Queensland will secure £25,000 of the £200,000 grant made available in the Federal Government's 1938-39 Estimates for the training of unemployed youths, the Queensland Government has decided to continue the existing schemes of vocational training for youths between the ages of eighteen and twenty-five years. The classes at present being conducted comprise:—(1) Commercial training at Brisbane, Toowoomba, Rockhampton, and Townsville; (2) practical farming at the Queensland Agricultural High School and College, Gatton; (3) scientific mining and prospecting at Charters Towers.

In the farming course applicants are enrolled as short-course students of Gatton College. The course is of twelve months' duration, and provides a sound practical training in farm operations. Whilst in attendance at the course free board will be provided, and an allowance of 10s. per week will be granted. It is possible to draw on this allowance in advance to meet the cost of outfit required.

It is hoped to have 100 students in attendance under the scheme in the early future.

All unemployed or temporarily employed young men between the ages of eighteen and twenty-five years are eligible for selection, and early application is advised.

Further information regarding the agricultural or other courses may be obtained from any technical college or high school, or any Labour Agent's Office, or direct from the Board of Juvenile Employment, Old Railway Offices, George street, Brisbane.

Success in Pork Production.

A young farmer who is doing the pig-raising correspondence course instituted by the Department of Agriculture and Stock, writes:—

"To be successful in pork production the first thing is to get suitable sows who produce good litters *and rear them.*

"We have a sow soon to come in on her fourth litter: to date, this sow has had—

1st litter	12, all reared.
2nd litter	13, all reared.
3rd litter	14, all reared.

She is a Tamworth-Berkshire cross and has not lost a pig."

"Pea-struck" Sheep.

When the Darling pea is in pod, its effects on animals are most noticeable. There is no medicinal treatment, but sheep noticed as affected should be removed immediately to a paddock in which the plant is not growing. Recovery is then certain and rapid, unless, of course, the animals are too far gone.

If practicable, the plants should be hoed out and destroyed. If very thick, a flame-thrower may be profitable to use.

One thing is certain, however—once sheep have acquired a taste for Darling pea they will always look for it; hence the necessity of grazing these particular sheep on country where the plant does not exist.

Treatment of Cream.

Dairy farmers are again advised to give close attention to the cooling, aerating, and stirring of cream. The flush growth of grass in the wet season often causes a gassiness in cream, as well as a "feedy" flavour. Aeration and cooling will do much to offset the development of these defects.

Navel Infection.

In newly-born animals, the navel is a prolific source of infection. Under farm conditions, it pays to treat the umbilical cord as soon as possible after birth. First, tie it with a string in a 5 per cent. carbolic solution, then paint the cord and surrounding area with a 5 per cent. iodine solution or dettol.

To Check a Bad Habit in Calves.

Skim milk-fed calves are often seen sucking each other after the buckets have been emptied. This bad habit should be stopped. Septic conditions, malformed teats, distorted udders, and early lactation in heifers may be traced to the habit of calf sucking calf. Either keep the calves away from one another by leg-roping until the taste of milk has dissipated, or feed them with meal—e.g., crushed or ground grain, pollard, bran, &c.—immediately after they have finished the milk.

Science—The Silent Service.

There was a time when farmers were inclined to look sideways at the man of science, but to-day science has no longer any terrors for the layman. The Science Congress at Canberra last month was welcomed generally as an important contribution to the cultural life of the Commonwealth. No longer are science people regarded as a class apart. Science, after all, is only organised common sense, and does not in any way confine knowledge in watertight containers or within the limits of a ring fence. Solid contempt for the ''mere theorist'' has gone, and nowadays we see the man of scientific knowledge working in double harness with the practical primary producer. Science works in silence. The modesty of the scientist is the modesty of the eager learner; his zeal is the zeal of the adventurer—the searcher for truth.

Blood Meal for Dairy Stock.

Blood meal feeding to dairy cattle presents little difficulty when the meal is fresh and free from objectionable odour. It may be incorporated in the regular feed or mixed with appetising foods, such as maize meal, bran, pollard, and cotton seed. Care should be taken, however, to see that the feed box is kept clean.

When moisture is present, blood soon fouls, and an objectionable odour results from the fermentation. Stock dislike this intensely, and it may be difficult to get animals into the bail where such food has lain.

The Horse's Nosebag.

The nosebag for working horses is more or less a necessary evil. Usually, it gets scant attention and yet the owner of horses so fed often wonders why they go off their midday feed, and yet eat greedily at night. He is then inclined to make the midday feed too light and the night feed too heavy. The reason is plain. Food residues in the nosebag have soured, because of the presence of moisture and saliva.

The considerate horse owner will turn the nosebag inside out each day and expose it to sunlight. Further, he will always keep a spare nosebag to use when the other goes to the weekly wash in hot suds.

Best Time to Poison Green Timber.

The autumn is the best time to poison green timber with arsenic pentoxide or sodium arsenite. If the job is done when the sap flow in the tree is ceasing, suckering will be reduced to a minimum.

Weather Forecasting.

The Australian Radio Research Board—which has been working in Sydney and Canberra on the physics of the upper atmosphere—has made a discovery which may prove of profound importance in weather forecasting. The discovery, which was largely accidental, was described at the Science Congress by Dr. D. F. Martyn.

Records extending over a period of approximately two years, he said, had shown a marked and unexpected association of certain electrical changes in the atmosphere 160 miles above the earth—one hundred and sixty miles—with the movement of ordinary areas of low barometric pressure in the lower atmosphere across the observing stations at Sydney and Canberra. Hitherto it had been assumed that the variations known to occur at great heights in the extremely attenuated ionosphere had been without influence on atmospheric conditions within 10 miles of the ground. A delegate from the United States described the effects observed in Australia as being of first-class importance. He said that it was unquestionable that Dr. Martyn's disclosure would initiate research elsewhere in the world to confirm his results and to explain, if possible, the cause and the significance of the effect noticed.

North Queensland Chilled Beef Production.

Professor Seddon, of the Queensland University, told the Science Congress that development of the wet coastal areas of North Queensland must be regarded as a venture of national importance. He said that the aims of this development should be a better utilisation of the land, the production of high-quality chilled beef, and a regular supply of this important commodity. On observations to date, he added, there was no doubt that suitable pastures could be established and maintained, and that they would provide adequate nutrition for regular and continued growth and fattening of steers taken there.

These animals would be taken off as prime chillers at any time of the year, and could be delivered to the works with a minimum of handling and after a short railway journey, thus leading to few rejections for bruising.

Because of the fattening process being continuous, the cattle could be fattened at an earlier age than was generally possible in North Queensland. Observations do not support the belief, he said, that the usefulness of this country will be short-lived, and the cost of establishing the right grasses will be uneconomic.

The pastures in the Northern lands now under experimental grazing, Professor Seddon remarked, are considered to be too valuable to be used for any purpose other than for their true national worth, which is the production of top-grade chilled beef at a time when it is most needed for export. The success of the Tully River scheme opens up the possibility of bringing large numbers of store cattle from the inland grazing areas and fattening them on the coast, where convenient facilities for treatment and shipment can be provided.

Politeness on the Poultry Run.

It pays to be polite to poultry. If you will always knock on the fowl-house door before entering, so an American poultry research workers says, the fowls will appreciate your courtesy, spring to attention, and face the door in a dignified manner. If you don't knock, the birds are apt to become excited, flutter round the coop, and knock themselves about.

The Modern Sausage.

The old-fashioned sausage is going modern. A Chicago company has just patented a sausage casing made of vegetable parchment and equipped with a zip opener of the same material. After cooking you merely yank the zipper, and "plonk!" the sausage jumps right out of its skin—easier than peeling bananas, in fact.

THE TOAST IS "AGRICULTURE."

Let mining magnates sip their wine
And puff their huge Havanas,
Let foreign nabobs richly dine
Surrounded by sultanas.
Our merchant princes go their way
While bankers bow before them.
What shall it profit them, if they
Forget the land that bore them?

But he whose husbandry can make
Two blades where one was growing,
And from the stubborn earth can take
The harvest of his sowing,
Such is the man who shall command
Our humble emulation
Whose work has made this fertile land
The birthright of a nation.

Then drink a health to men of old
Who farmed this land before us
Through rain and drought, through heat and cold,
They well deserve this chorus,
Australia breeds men of parts
Its maids are lovely charmers,
But the toast we give with fervent hearts
Is—"Gentlemen, The Farmers."

—Adapted from verses by T. A. Robertson in *Veld* (South Africa) and reprinted from *The Farmer and Stockbreeder* (England).

Farm Notes

MARCH.

LAND on which it is intended to plant winter cereals should be in a forward stage of preparation. Sowings of lucerne may be made at the latter end of the month on land which is free from weed growth and has been previously well prepared.

The March-April planting season has much in its favour, not the least of which is that weeds will not make such vigorous growth during the succeeding few months, and, as a consequence, the young lucerne plants will have an excellent opportunity of becoming well established.

Seed wheat should be treated with copper carbonate for the control of bunt. For oats and barley seed the use of formalin or a reliable mercury dust is advisable.

Potato crops should be showing above ground, and should be well cultivated to keep the surface soil in good condition; also to destroy any weed growth.

In districts where the potato crop is subject to Irish blight it is advisable to spray the plants for the control of this disease. Bordeaux mixture of 4.4.40 strength should be applied at least three times at intervals of ten days to a fortnight, commencing when the plants are about six weeks old.

Maize crops which have fully ripened should be picked as soon as possible and the ears stored in well-ventilated corn cribs, or barns. Selected grain which is intended for future seed supplies should be well fumigated for thirty-six hours and subsequently aerated and stored in airtight containers. The germination of the maize is not normally affected by this treatment if dry and mature when treated.

The following crops for pig feed may be sown:—Mangel, sugar beet, turnips and swedes, rape, field cabbage, and carrots. Owing to the small nature of the seeds, the land should be worked up to a fine tilth before planting, and should contain ample moisture in the surface soil to ensure a good germination. Particular attention should be paid to all weed growth during the early stages of growth of the young plants.

As regular supplies of succulent fodder are essentials of success in dairying operations, consideration should be given to a definite cropping system throughout the autumn and winter, and to the preparation and manuring of the land well in advance of the periods allotted for the successive sowings of seed.

The early-planted cotton crops should be now ready for picking. This should not be done while there is any moisture on the bolls, either from showers or dew. Picked cotton showing any trace of dampness should be exposed to the sun for a few hours on tarpaulins, bags, or hessian sheets, before storage in bulk or bagging or baling for ginning. Sowings of prairie grass and *Phalaris tuberosa* (Toowoomba canary grass) may be made this month. Both are excellent winter grasses. Prairie grass does particularly well on scrub soil.

Dairymen who have maize crops which show no promise of returning satisfactory yields of grain would be well advised to convert these into silage to be used for winter feed. This, especially when fed in conjunction with lucerne or cowpea, is a valuable fodder. Where crops of Sudan grass, sorghum, white panicum, Japanese millet, and liberty millet have reached a suitable stage for converting into silage, it will be found that this method of conserving them has much to recommend it. If permanent storage facilities are not available on the farm the stack method offers a practical alternative. Stacking with a framework of poles, and well weighting the fodder, is necessary for best results. All stacks should be protected from rain by topping off with a good covering of bush hay built to a full eave and held in position by means of weighted wires.

Orchard Notes

MARCH.

THE COASTAL DISTRICTS.

IF the weather is favourable, all orchards, plantations, and vineyards should be cleaned up, and the ground brought into a good state of tilth so as to enable it to retain the necessary moisture for the proper development of trees or plants. As the wet season is frequently followed by dry autumn weather, this attention is important.

Banana plantations must be kept free from weeds, and suckering must be rigorously carried out. There is no greater cause of injury to a banana plantation than neglect to cultivate. Good strong suckers will give good bunches of good fruit. Weedy overcrowded suckers will only give small bunches of undersized fruit hard to sell, even at a low price.

Cooler weather may tend to improve the carrying qualities of the fruit, but care should still be taken to see that it is not allowed to become over-developed before it is packed, otherwise it may arrive at its destination in an over-ripe and consequently unsaleable condition. The greatest care should be taken in grading and packing fruit. Small or inferior fruit should never be packed with good large fruit.

There has been a marked increase in the banana thrips population in some districts in which this pest is well established. Growers who consider it necessary to deal with banana thrips are advised to apply to the Department for the latest information on how to deal with this pest.

The marketing of the main crop of pineapples, both for canning and the fresh fruit trade, will be completed in the course of the month, and as soon as the fruit is disposed of plantations, which are apt to become somewhat dirty during the gathering of the crop must be cleaned up. All weeds must be destroyed, and if blady grass has got hold anywhere it must be eradicated, even though a number of pineapple plants have to be sacrificed, for once a plantation becomes infested with this weed it takes possession and soon kills the crop. In addition to destroying all weed growth, the land should be surface worked and brought into a state of nice tilth.

In the Central and Northern districts, early varieties of the main crop of citrus fruits will ripen towards the end of the month. They will not be fully coloured, but they can be marketed as soon as they have developed sufficient sugar to be palatable; they should not be gathered whilst still sour and green.

As blue mould is likely to cause heavy loss in coastal citrus, especially in long-distance consignments, special precautions should be taken for minimising this loss.

It must be remembered that the blue mould fungus will only attack bruised or wounded fruit; hence it is necessary to be careful that no injuries are given by the clippers or finger nails during picking. Fruit should be cut and not pulled. Long stalks which may injure other fruit must be cut away.

The fruit must be carefully handled and accurately packed so as to avoid bruising. Any injured fruit should be discarded. In order to reduce the number of fungus spores present in the plantation, all waste fruit in the orchard or packing shed should be collected at frequent intervals and destroyed by fire or burying.

Fruit must be carefully graded for size and colour, and only one size of fruit of one quality should be packed in one case. The standard bushel case, the inside measurements of which are 18 by 11½ by 10½ inches, is the best for citrus. The fruit must be sweated for seven days before it is sent to the Southern markets, in order to determine what fruit has been attacked by fruit fly, and also to enable bruised or injured fruit liable to blue mould to be removed prior to despatch.

Growers are reminded that the control of the bronze orange bug is best achieved by spraying with the resin-caustic soda-fish oil mixture normally either late in March or early in April. Applied at this time of the year, the spray can give a mortality of 98 per cent. of the bronze bugs, which are then present solely in the very young stages. This spray is also very effective against several of the important scale insects infesting citrus.

Red scale is a pest to which citrus growers will shortly have to give attention, it being considered that control is best established from the middle of March to early in April. Fumigation with hydrocyanic acid gas is most effective against red scale, but success may also be achieved with white oils or with the resin-caustic soda-fish oil mixture evolved for the control of the bronze orange bug. Red scale, of course, is pre-eminently a pest of the hotter, drier citrus districts.

Strawberry planting may be continued during the month, and the advice given in last month's notes still holds good. Remember that no crop gives a better return for extra care and attention in the preparation of the land and for generous manuring than the strawberry.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

THE advice given in these notes for the last few months regarding the handling, grading, and packing of fruit should still be followed carefully. The later varieties of apples and other fruits are much better keepers than earlier-ripening sorts, and as they can be sent to comparatively distant markets, the necessity for very careful grading and packing is, if anything, greater than it is in the case of fruit sent to nearby markets for immediate consumption. Instruction in the most up-to-date methods of grading and packing fruit has been published by the Department, which advice and instruction should enable growers to market their produce in a much more attractive form.

The same care is necessary in the packing of grapes. Those who are not expert cannot do better than follow the methods of the most successful packers.

As soon as the crop of fruit has been disposed of, the orchard should be cleaned up, and the land worked. If this is done, many of the fruit-fly pupæ that are in the soil will be exposed to destruction in large numbers by birds, or by ants and other insects. If the ground is not worked and is covered with weed growth, there is little chance of the pupæ being destroyed.

Where citrus trees show signs of the want of water, they should be given an irrigation during the month, but if the fruit is well developed and approaching the ripening stage, it is not advisable to do more than keep the ground in a thorough state of tilth, unless the trees are suffering badly, as too much moisture is apt to produce a large, puffy fruit of poor quality and a bad shipper. A light watering is therefore all that is necessary in this case, especially if the orchard has been given the attention recommended in these notes from month to month.

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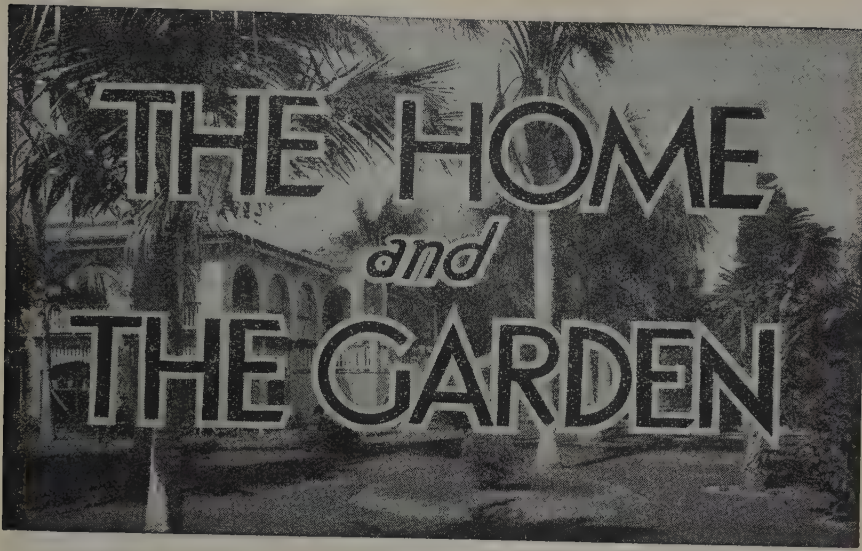
PINEAPPLE DISTRIBUTION SCHEME.

Following on representations made by the growers of pineapples to the Minister for Agriculture and Stock (Mr. F. W. Bulcock), a scheme has been inaugurated, to operate during the months of February, March, and April, for the distribution of fresh pineapples direct from the grower to the consumer. The scheme is being administered by the Committee of Direction of Fruit Marketing, which is acting in collaboration with the Railway Department and the Woombye Fruitgrowers' Association. Pineapples are being offered at a uniform price delivered to any railway station in Queensland in cases of three different sizes, i.e., half-bushel, bushel, and bushel and a-half. These cases are quoted respectively at 3s. 9d., 5s. 6d., and 6s. 6d., freight paid. A half-bushel case will hold from six to ten pineapples, a bushel case from eleven to twenty, and a bushel and a-half case from twenty-one to thirty. Orders, accompanied by cash, are being received by all railway station masters in Queensland.

The scheme, which is to operate during the marketing of the summer crop of pineapples, provides an opportunity for householders, particularly those in the country, to obtain supplies of this luscious fruit at reasonable prices.

Plate 107.

FROM GOD'S GOOD EARTH HIS GIFT OF CANE.—The Fertile Fields of the South Johnstone District, North Queensland.



Our Babies.

Under this heading a series of short articles, by the Medical and Nursing Staffs of the Queensland Baby Clinics, dealing with the care and general welfare of babies has been planned in the hope of maintaining their health, increasing their happiness, and decreasing the number of avoidable deaths.

THE CODDLED CHILD.

A MOTHER arrived with a baby aged nine months at one of our Baby Clinics the other day seeking advice regarding a rash which had appeared on the child's body. It was noticed that in addition to the cotton and wool singlet, he was wearing a petticoat and dress. The mother stated that the child had suffered from "a cold in his chest" during the winter and she had been afraid to remove the extra clothing.

The rash was due to over-clothing. The tradition that illness is caused by a chill and that wrapping the child up is a means of preventing it, is deeply rooted in the minds of many. No one doubts the necessity of providing adequate covering for premature and delicate infants whose heat-regulating mechanism is not fully developed, but a robust, well-developed child is capable of adapting himself to changes of temperature if he is allowed to use his limbs and move his body freely, unhampered by clothing. Once able to run about, a healthy child, if not overclad, is able to adjust himself to changes of temperature without ill-effects or apparent discomfort. A child, whose older brother had suffered from asthma, was found to be developing symptoms of the disease. The doctor pointed out to the mother that he was being "coddled" and overclad. She was persuaded to expose the child's skin to the air with ultimately good results.

Function of the Skin.

The skin plays a vitally important part in heat regulation. It is a useful and not merely a ornamental covering of the body. While the body loses heat by the evaporation of moisture from the skin and lungs, most of the heat is lost by conduction and radiation. Production of heat takes place mainly in the muscles. By a delicately adjusted piece of mechanism the body in health is maintained at a temperature best suited to the carrying on of its functions and activities. The part played by the skin in heat regulation is very important and its function, like the function of any other part of the body, should be exercised and encouraged to develop normally in order that it may contribute its share in building up the defences of the body against the invasion of disease. The function of the skin in developed and strengthened by exposing it to light, air, and sun. If the child is overclad or unsuitably clad the function of the skin becomes impaired and he becomes an easier prey to disease. Coughs and colds are infections and are caused by the inhaling of germs from persons suffering from them. If the skin has not been allowed to develop its power to withstand changes of temperature, chilling of the body occurs, and this lowers its resistance to disease. This is why the coddled child feels the changes in temperature and suffers in consequence.

The healthy, hardy child whose skin is active and prepared for changes in temperature, does not suffer from chilling and maintains a high state of resistance to infection by germs. A sudden attempt should not be made to harden the child who has been coddled. The hardening process must be carried out gradually. Watch the changes in temperature and begin by allowing the child to leave off a garment on a warmer day. It is surprising how quickly he becomes used to wearing fewer clothes and appreciates it. He will require fewer bed clothes also. Accustom him to having his body exposed to light, air, and sun, but avoid sunburning. If you proceed resolutely and courageously, the hardening process will continue, your fears will gradually vanish, and by the time it is completed you will be a less anxious and happier mother. At times during the process your confidence will be shaken and you will be tempted to blame the treatment for the first cold that he happens to contract, but with determination and perseverance you will achieve your object.

You may obtain information on all matters concerning child welfare by visiting the nearest Baby Clinic or by writing to the Sister in Charge, or by communicating direct with the Baby Clinic Training Centre, Alfred street, Valley, N.1, Brisbane.

IN THE FARM KITCHEN.

PEANUTS FOR THE TABLE.

The following recipes are particularly suitable for light "snacks" during the hottest days and nights:—

Sandwich Filling.

A delightful sandwich filling may be made as under:—

1 cup of milk or water
1 tablespoon of flour
½ tablespoon water
1 egg
1 teaspoon salt
1 tablespoon of sugar
1 tablespoon butter or other fat
¼ cup of vinegar
Red pepper
2 cups of roasted peanuts ground fine.

Heat the milk, and, while it is heating, mix the flour with the water and add eggs, salt, and sugar. To this mixture add the heated milk. Cook five minutes, stirring constantly. Then add butter, vinegar, and ground peanuts.

Peanut Salad with Bananas.

Slice bananas through the centre, spread out on lettuce leaves, and sprinkle liberally with chopped peanuts. Serve with mayonnaise or plain salad dressing.

Peanut Fondu.

1 cup of finely ground peanuts
1 cup dried Liberty bread crumbs
1 egg
1¾ cups milk
1½ teaspoons salt
Dash of paprika

Grind the peanuts fine. Mix all the ingredients except the white of egg. Beat egg white very stiff and fold in. Bake in a butter baking dish for thirty or forty minutes in a moderate oven.

Peanut Muffins.

¾ cup corn meal
1¼ cup rye flour
1 cup finely ground peanuts
1 egg
1 teaspoon salt
1¼ cup of milk
4 teaspoons baking powder

Add liquids to dry ingredients and mix well. Bake in well-greased muffin pans.

Parched Corn Meal Biscuits.

½ cup of yellow corn meal
1 teaspoon salt
1 cup peanut butter
1½ cup water

Put the meal in a shallow pan and heat in the oven until it is a delicate brown, stirring frequently. Mix the peanut butter, water, and salt, and heat. While this mixture is hot, stir in the meal, which also should be hot. Beat thoroughly. The dough should be of such consistency that it can be dropped from a spoon. Bake in small cakes in an ungreased pan. This mixture makes sixteen biscuits.

Peanut Loaf.

1 cup chopped peanuts
2 cups Liberty bread crumbs
2 tablespoons melted fat
1 egg
½ teaspoon salt
½ teaspoon pepper
½ to ¾ cup of milk

Mix, using enough milk to make a moist loaf. Put in buttered pan and bake an hour in a moderate oven, keeping covered the first half-hour. Baste once or twice with melted fat. Turn into a hot platter and sprinkle with chopped peanuts.

Peanut Brownies.

½ cup of corn syrup
2 tablespoons strained honey
1 square chocolate
¾ cup buckwheat flour
½ teaspoon baking powder
1 cup chopped peanuts
¼ teaspoon salt
1 teaspoon vanilla

Melt the chocolate and mix with the corn syrup and honey. To this add 1 teaspoon of vanilla and the dry ingredients—flour, baking powder, salt, and nuts. Mix well and pour by the spoonful on well-greased pan. Bake in a moderate oven.

Peanut Sausage.

1 cup mashed potatoes
1 cup ground roasted peanuts
1 egg, well beaten
1½ teaspoon salt
⅛ teaspoon pepper
Salt pork, bacon, or other fat

Mix the mashed potatoes and seasonings with the ground nuts. Add beaten egg. Form into little cakes or sausages, roll in flour, meal, or Liberty bread crumbs, and place in greased pan with a small piece of fat or salt pork on each sausage. Bake in fairly hot oven until brown.

Creamed Peanuts on Toast.

2 cups milk
1 cup finely ground roasted peanuts
1 teaspoon salt
1 teaspoon corn starch
1 teaspoon onion juice
¼ cup chopped stuffed olives

Canned pimentos, chopped green peppers cooked until tender, or cooked celery are equally as good as stuffed olives.

Scald milk in the double boiler, reserving a tablespoon of cold milk to mix with the corn starch. Add with onion juice and other seasonings to the hot milk. Let come to a boil and finish cooking over the double boiler. Add the peanuts the last thing before serving. Serve on toast. Good for a luncheon dish.

Creamed Peanuts and Rice.

1 cup rice (uncooked)
2 cups chopped peanuts
½ teaspoon paprika
2 teaspoons salt

White Sauce—
3 tablespoons flour
3 tablespoons fat
3 cups milk (whole or skim)

Boil the rice and make a white sauce by mixing the flour in the melted fat and mixing with the milk. Stir over fire until it thickens. Mix rice peanuts and seasoning with the sauce, place in greased baking dish and bake for twenty minutes.

Peanut Brittle.

1 cup white corn syrup
1 tablespoon vinegar
¼ teaspoon salt
1 teaspoon vanilla
1 cup freshly roasted peanuts, halved

Cook the corn syrup, vinegar, and salt in a saucepan until a little dropped in cold water forms a soft ball. Put the peanuts and this syrup into an iron skillet and stir until the syrup becomes a golden brown. Remove from the fire and stir in vanilla. Have ready a shallow buttered pan, pour candy in and spread out in a thin sheet. Allow to cool, then remove from pan and crack into pieces.

Peanut Pop Corn Balls.

2 quarts freshly popped corn
2 cups freshly roasted peanuts
1 cup corn syrup
1 tablespoon vinegar
½ teaspoon salt
1 teaspoon vanilla

Boil the syrup, vinegar, and salt until the syrup hardens when dropped in cold water. Add vanilla. Pour, while hot, over the popcorn and peanuts, and mix well. When cool enough to handle, grease the hands and form into balls.

Plate 108.

A Heavy Covering of Rich Pasture.—Typical rain-forest country cleared and sown with introduced grasses on Utchee Creek, North Queensland.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF DECEMBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING 1938 AND 1937, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Dec.	No. of years' records.	Dec., 1938.	Dec., 1937.
North Coast.	In.		In.	In.
Atherton	7 30	37	1·20	6·07
Cairns	8 67	56	4·19	4·55
Cardwell	8·18	66	2·80	2·08
Cooktown ..	6 57	62	3·87	2·64
Herberton ..	5·73	52	0·96	4·72
Ingham	6·91	46	1·12	0·66
Innisfail	11·70	57	3·08	1·87
Mossman Mill ..	10·18	25	3·15	2·18
Townsville ..	5·43	67	..	0·06
Central Coast.				
Ayr	3·95	51	0·50	..
Bowen	4·40	67	..	0 61
Charters Towers ..	3·26	56	0·06	1·81
Mackay P.O. ..	7·06	67	1·61	1·20
Mackay Sugar Experiment Station	7·98	41	1·91	1·96
Proserpine ..	7·62	35	0·57	0·74
St. Lawrence ..	4·71	67	0·86	1·74
South Coast.				
Biggenden ..	4·66	39	1·45	2·31
Bundaberg ..	5·08	55	0·23	3 77
Brisbane	4 89	86	0·41	4·53
Caboolture ..	5·23	51	0·27	4·47
Childers	5·71	43	0·94	6·84
Crohamhurst ..	7·18	45	0·24	6·00
Esk	4·69	51	..	3·05
South Coast—contd.	In.		In.	In.
Gatton College ..	3·76	39	..	3·37
Gayndah	4·19	67	0·10	2·92
Gympie	5 43	68	1·91	4·23
Kilkivan	4·58	59	0·29	4·94
Maryborough ..	5·08	67	0·34	3·23
Nambour	6·76	42	0·54	5·16
Nanango	3·81	56	0·26	3·20
Rockhampton ..	4·79	67	1·01	3·24
Woodford ..	5·53	51	0·08	3·45
Central Highlands.				
Clermont ..	3·79	67	1·45	0·80
Gindie	2·78	39	..	1·56
Springsure ..	3·24	69	0·29	2·47
Darling Downs.				
Dalby	3·34	68	0·23	1·37
Emu Vale ..	3 47	42	0·79	2·28
Hermitage ..	2·94	32	..	0·95
Jimbour	3·29	50	..	1·53
Miles	3·15	53	0·06	2·17
Stanthorpe ..	3·60	65	1·48	3·10
Toowoomba ..	4·45	66	0·30	4·10
Warwick	3·45	73	0·56	2·69
Maranoa.				
Bungeworgorai ..	2·96	24	..	0·80
Roma	2·56	64	..	1·44

A. S. RICHARDS, Divisional Meteorologist.

CLIMATOLOGICAL TABLE—DECEMBER, 1938.

COMPILED FROM TELEGRAPHIC REPORTS.

Districts and Stations.	Mean Atmospheric Pressure, at 9 a.m.	Shade Temperature.						Rainfall.	
		Means.		Extremes.					
		Max.	Min.	Max.	Date.	Min.	Date.	Total.	Wet Days.
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	29·80	87	75	93	9	69	9, 23	387	11
Herberton	..	82	63	95	12, 13	54	8, 9	96	4
Rockhampton	29·90	91	71		12	65	7	101	5
Brisbane	29·94	86·4	69·3	101 102·3	11	60·5	5	41	2
Darling Downs.									
Dalby	29·92	94	64	107	25	52	14	23	2
Stanthorpe	..	86	57	98	19, 20, 21	42	14	148	2
Toowoomba	..	89	62	101	24, 25	48	2	30	2
Mid-Interior.									
Georgetown	29 81	101	73	107	25	65	8	64	3
Longreach	29 82	104	74	113	11, 12	67	20	..	..
Mitchell	29 87	99	68	108	10	49	3	..	..
Western.									
Burketown	29·79	99	78	106	14	71	7	73	1
Boulia	29·68	106	76	116	10	66	2, 3, 4, 5	..	..
Thargomindah ..	29·81	103	71	117	27	57	2	..	..

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	February, 1939.		March, 1939.		MOONRISE. Feb., 1939.	Mar., 1939.
	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					p.m.	p.m.
1	5·25	6·46	5·45	6·24	3 45	2·28
2	5 26	6·46	5·46	6·23	4·42	3·21
3	5 27	6 45	5·47	6·22	5·36	4·13
4	5·27	6·45	5·47	6·21	6·27	4·57
5	5·28	6 44	5·48	6·20	7·12	5·45
6	5·29	6·43	5·49	6·19	7 55	6·27
7	5·29	6 43	5·49	6·18	8 35	7·10
8	5·30	6·42	5·50	6·17	9·16	7·55
9	5·31	6·41	5·50	6·16	10 1	8·36
10	5·32	6·40	5·51	6·15	10·43	9·21
11	5·32	6·39	5·51	6·13	11·27	10·7
12	5·33	6·38	5·52	6·12	a.m.	10·56
13	5·34	6·38	5·52	6·11	12·12	11·45
14	5 35	6·37	5·53	6·10	1·0	..
						a.m.
15	5·35	6·37	5·53	6·9	1·52	12·37
16	5·36	6 36	5·54	6·8	2·42	1·29
17	5·37	6·35	5·54	6·7	3·33	2·20
18	5·37	6·34	5·55	6·6	4·25	3·12
19	5·38	6·33	5·55	6·4	5·16	4·3
20	5·39	6·32	5·56	6·3	6·8	4·55
21	5·39	6 31	5·56	6·2	7·0	5·46
22	5·40	6·30	5·57	6·1	7·52	6·41
23	5·41	6·29	5·57	6·0	8·46	7·36
24	5·41	6·28	5·58	5·59	9·39	8·31
25	5·42	6·27	5·58	5·58	10·35	9·29
26	5·43	6·26	5·59	5·57	11·33	10·27
					p.m.	
27	5 44	6·25	5·59	5·56	12·32	11·26
						p.m.
28	5·45	6·24	6·0	5·55	1·30	12·20
29			6·0	5·54		1·15
30			6·1	5·53		2·4
31			6·1	5.52		2·51

Phases of the Moon, Occultations, &c.

4th Feb.	○ Full Moon	5 55 p.m.
11th „	☾ Last Quarter	2 12 p.m.
19th „	● New Moon	6 28 p.m.
27th „	☽ First Quarter	1 26 p.m.

Perigee, 4th February, at 10.0 a.m.
Apogee, 17th February, at 12 noon.

On the 19th Mercury will be beyond the Sun from the Earth, but soon afterwards it will be seen emerging from the afterglow of the Sun, mounting higher until it reaches the furthest limit east of our great Magnet which holds it securely in its elliptical orbit.

Mercury rises at 4.45 a.m., 40 minutes before the Sun, and sets at 5.46 p.m., 1 hour before it, on the 1st; on the 15th it rises at 5.16 a.m., 19 minutes before the Sun, and sets at 6.30 p.m., 7 minutes before it.

Venus rises at 2.2 a.m., 3 hours 23 minutes before the Sun, and sets at 3.31 p.m., 3 hours 31 minutes before it, on the 1st; on the 15th it rises at 2.8 a.m., 3 hours 27 minutes before the Sun, and sets at 3.40 p.m., 2 hours 57 minutes before it.

Mars rises at 12.24 a.m. and sets at 1.53 p.m. on the 1st; on the 15th it rises at 12.2 a.m. and sets at 1.38 p.m.

Jupiter rises at 7.23 a.m. and sets at 8.12 p.m. on the 1st; on the 14th it rises at 6.26 a.m. and sets at 7.48 p.m.

Saturn rises at 10.8 a.m. and sets at 9.57 p.m. on the 1st; on the 14th it rises at 9.22 a.m. and sets at 9.10 p.m.

Following the Milky Way we see the most luminous constellations, from the Southern Cross and the Pointers in the south-east to the Pleiades in the north-west. First and second magnitude stars in Auriga, Perseus, and Aries are near the horizon in the north-west, while Leo with the bright star Regulus has arisen in the east. Castor and Pollux and Camm's Mirror with Procyon are now well above the horizon, north-eastward; westward from the foot of the Cross gleams Achernar, the end of the River. Sirius and Canopus, the two most brilliant of all stars, will be seen till the end of May. With some magnification some fine clusters of stars may be found, as for instance in Gemini and Cancer, the constellation eastward of it, and in Argo Navis, and a small telescope would reveal Binary stars.

6th Mar.	○ Full Moon	4 0 a.m.
13th „	☾ Last Quarter	7 37 a.m.
21st „	● New Moon	11 49 p.m.
28th „	☽ First Quarter	10 16 p.m.

Perigee, 4th March, at 9.0 a.m.
Apogee, 17th March, at 1.0 a.m.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S. add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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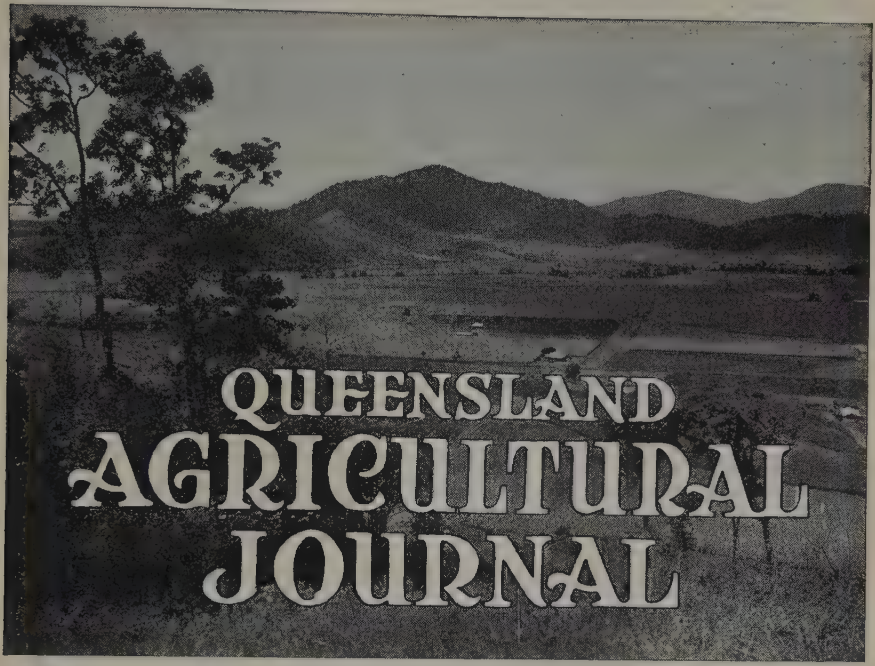
ANNUAL RATES OF SUBSCRIPTION.—Farmers, Graziers, Horticulturists, and Schools of Arts, **One Shilling,** members of Agricultural Societies, **Five Shillings,** including postage. General Public, **Ten Shillings,** including postage.



QUEENSLAND AGRICULTURAL JOURNAL

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Event and Comment

Progress of the Dairy Industry.

PRAISING the Queensland dairy industry for the solid progress it had made in output and value at a farewell gathering in honour of the Minister for Agriculture and Stock, Hon. Frank W. Bulcock, the Premier, Hon. W. Forgan Smith, LL.D., went on to describe the marketing problems which would have to be solved before prosperity and peace could be restored in the world.

Queensland had led the way in regard to organisation in the farming industry, said the Premier. That required a good deal of enthusiasm and hard work, and above all an abiding and deep faith in the future of the State.

Dairying in Queensland had advanced by leaps and bounds. In 1938 there was record production of butter—140 million pounds as against the previous highest output of 133 million pounds in 1934. The value of butter production in 1938 was £8,200,000; in 1937 the factory output was 96,000,000 pounds of a value of £5,600,000. Queensland had moved into first place among the butter exporting States; exports last year were 88,100 tons as against 78,021 the previous year. Queensland contributed £4,534,924 to the total of Australia's exports. Cheese had advanced similarly.

These increases in butter production, value, and export, had meant that in this part of the economic life of the State great progress had been made. Furthermore, the quality of Queensland butter had improved enormously, which indicated that the right methods were being adopted.

There were still, however, serious problems to be faced. It was an extraordinary thing that in the world to-day the problem of production had been solved, but the problem of an equitable and just distribution had not been solved. In the days when he was studying the theory of economics, there was a belief in some quarters that population would overtake the needs of mankind—that world production would be unable to feed the population. Its supporters did not realise what science applied to agriculture would do.

"No limit can be placed to the capacity to produce," said the Premier. "Methods can be adapted to meet changing needs, but you have also with this capacity to produce the problem of selling at a reasonable price the things you grow."

Co-operation had improved their conditions enormously. No one in Queensland would have the temerity to advocate a repeal of the measures that enabled that co-operation. The future lay with all working to achieve the maximum of co-operation in the work of civilisation itself.

The Great War had left a terrible legacy of death, maiming, and intolerable debt. The aftermath was the growth of economic nationalism; every nation was trying to buy, and every nation was trying to sell. Many currency expedients had been resorted to, and standards of value had been altered. There had been an international agreement whereby gold at £4 5s. per fine ounce was the standard of value, but most countries had now departed from the gold standard. New standards had to be adopted, and throughout the world there was now no co-operation in trade and no international understanding to promote the flow of trade. The problem of exchange as between various countries had complicated all forms of commercial transactions, and stifled the possibility of trade in a normal way between countries.

As an example, the Premier mentioned that when he was in England, butter from Holland was quoted at 11d. per lb. f.o.b. Dutch ports, whereas the price for home consumption in Holland was 2s. 6d. The Danes exported butter, and themselves ate margarine. Beet sugar in certain European countries was exported and sold at 1d. a pound, whereas it cost 8d. in the countries of origin. The desire of these exporting countries was to establish sterling credits in London, not necessarily to buy British goods in return, but in order to buy in the various markets of the world the materials they could not do without.

"The result is that the standard of living of all those people is much lower than it should be. Consequently, producers of every kind of necessary commodity have their markets very seriously limited. If a standard of value could be established in the various countries of the world on a similar basis, trade could be carried on more freely than at present, and many of your problems would be swept away."

Mr. Forgan Smith denied that this prospect was Utopian, and said it was not nearly so difficult a problem as the realignment of geographical boundaries between countries. It was a problem that must be solved if civilisation was not to decline and decay. Trade must be resumed on a normal basis before world peace could be restored, for the prevailing conditions were breeding fear and international jealousy, and fear was at the bottom of all forms of evil.

"There is no overproduction when hundreds of thousands of people have insufficient food, clothing, and shelter. The remedy must be applied somehow, some time, and the sooner we get on with the business the better. The best way to start is to clear the ground so that we can get a bird's-eye view of the job before us."

Service to the State.

ACKNOWLEDGING the compliment paid him by the Queensland Butter and Cheese Boards at a farewell gathering on the eve of his departure on his mission abroad, the Minister for Agriculture and Stock said that the conditions in the countries that he would visit were comparable with those in Queensland, and the work being undertaken must necessarily have some bearing on our own prosperity and advancement.

While the dairy industry was buoyant and the various organisations were doing everything to promote a healthy spirit and prosperity, they must ask to what degree they were coping with the fundamental problems. These were of three kinds. There were the problems such as stock hygiene that the farmer himself may overcome. The second class of problems was more difficult, requiring the co-operation of factory managements, producers, and the Department. The third kind was almost entirely beyond the ken of the producer as far as remedial measures were concerned—that of economic loss arising from disease and parasites peculiar to animal husbandry, and preventible economic loss on the manufacturing side of the industry.

The dairy research laboratory of his Department, Mr. Bulcock continued, was the first in Australia, and even now there was only one other. It had made a material contribution to the welfare of the industry. He intended to have a look at the work of dairy research laboratories in other parts of the world dealing with problems of both manufacture and production. The whole science of dairy research was comparatively new, and he would particularly like in the United States to see what could be incorporated in our own practices.

Feeding was a most important thing in relation to the general economy of dairying, and it could not be said that the last word in feeding had been achieved. Experts were working out balanced rations and testing the nutritive value of crops and pastures, but the dependence on grass pasturage was not sufficiently realised. There was, however, a growing consciousness of the importance of grass; to-day much of the work of the agricultural branch and some of the work of the dairying branch of his Department was concerned with the laying down of pasturage and the introduction of new varieties.

"I am going to see in what directions our State may be better served," said the Minister. He hoped to visit Ohio, where a complete rejuvenation of the cheese industry was effected four or five years ago, their problems being precisely the same as ours.

He added that he was fortunate in two things: in having a man like Mr. Harry Heers at the head of the dairy industry, and in the excellent type of young men being recruited to the Department imbued with the ideal of service to the industry, and, consequently, service to the State.

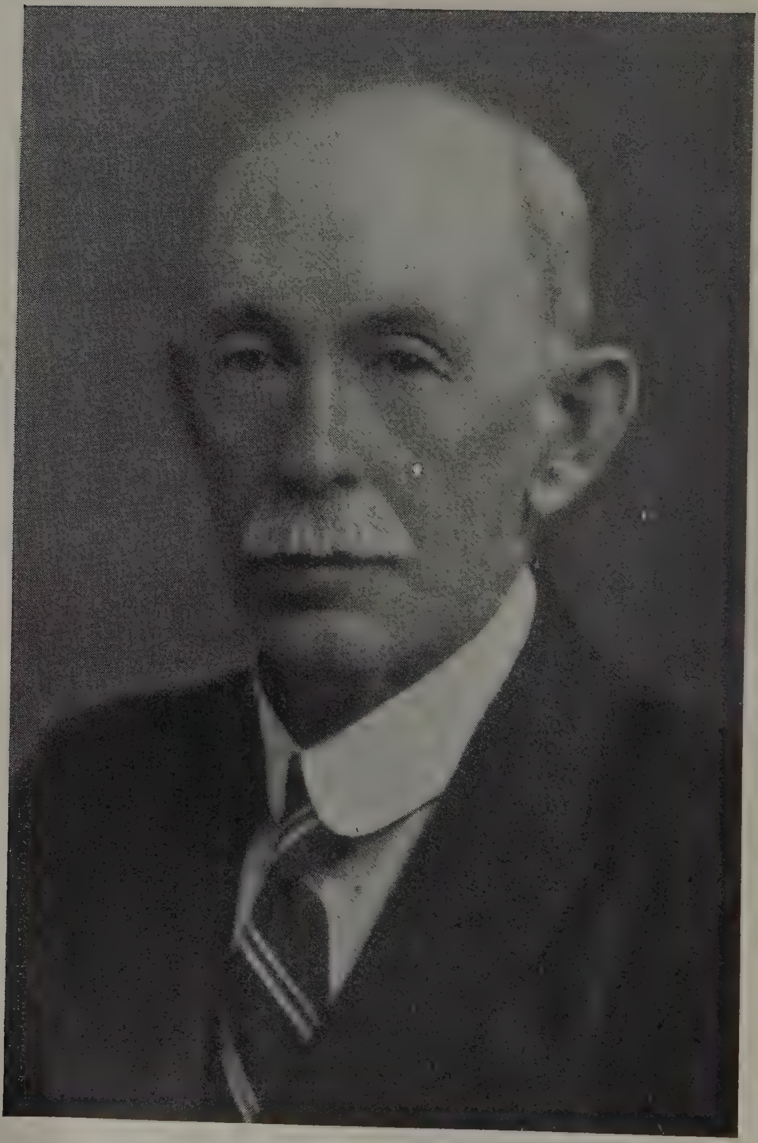


Plate 109.

HON. DAVID A. GLEDSON.

Acting Minister of Agriculture and Stock.

HON. DAVID A. GLEDSON.

ACTING MINISTER FOR AGRICULTURE AND STOCK.

DURING the absence of the Hon. Frank W. Bulcock on a mission of investigation into various rural problems abroad the Hon. David A. Gledson will have charge of his Department as Acting Minister for Agriculture and Stock.

As the representative of Ipswich—the important commercial centre of the rich agricultural province of West Moreton—Mr. Gledson has been associated for many years with rural industry and has assisted greatly in its progress. Representing, too, a great mining and industrial constituency he has made a close study of the economics of distribution and consumption as well as of production, and also of other important factors which influence stability, and balance in industry generally.

Mr. Gledson entered The State Parliament in 1915 as the successful contender for the Ipswich seat against the Hon. James Blair (afterwards Sir James Blair, K.C.M.G., Chief Justice and Deputy Governor of Queensland), then Minister for Public Instruction. Except for one break of three years—1929 to 1932—Mr. Gledson has represented Ipswich ever since. During most of that time he was chairman of party committees appointed to consider the details of projected legislation. From 1925 to 1926 he was Assistant Minister in Charge of State Enterprises, which included State cattle stations, State butcheries, canneries, and cold stores.

When the Department of Labour and Industry was established in 1926 Mr. Gledson was appointed to the new portfolio and continued as Minister of that Department until 1929, when the Government of which he was a member met defeat at the polls. Since 1932 he has been Temporary Chairman of Committees in the Legislative Assembly.

Mr. Gledson is one of the stalwarts of the Australian Labour Movement, and for a great number of years has been prominent in its councils.

Field Notes on some Rain Forests and Rain Forest Trees of Tropical Queensland.

W. D. FRANCIS, Botanist.

[Some time ago the writer visited forestry survey camps on the Atherton Tableland, Mount Spec, and the Eungella Range, and the present paper is largely the result of these three visits. The field characters of the trees as given by the writer should be of value to foresters, timber-men, and others who have any contact with the trees of the ''big scrub,'' as the rain forests are frequently somewhat incorrectly designated.]

THE rain forests of tropical Queensland do not differ essentially in appearance from the more luxuriant rain forests in subtropical regions further south. In the northern forests, however, large-leaved species of shrubs and trees are a little more in evidence. There is also a greater variety of palms, both arborescent and climbing, in the northern rain forests. The climbing palms are chiefly represented by the lawyer palms (*Calamus* spp.).

From cursory examinations it appears that the trees on the northern highlands such as the Atherton Tableland and the Eungella Range are noticeably higher than the trees in the northern lowland rain forests. F. Kajewski has made a similar observation (White, C. T., 1933). The altitude of the Atherton Tableland varies from 2,000 to 4,000 feet, and that of the Eungella Range from 2,000 to 3,000 feet. The Mount Spec rain forests also are at an altitude of 2,000 to 3,000 feet.

As in the luxuriant rain forests of subtropical Australia, the species constitution of the northern rain forests is very complex. Only in exceptional cases are there evident dominant species. When there are evident dominant species, there are often extreme or remarkable climatic or soil conditions. For instance on dry hillsides or on moist, water-logged flats dominant species are most frequently observed; but in cases where the soil and climate are suited to a large variety of species instances of dominant species are not common so far as the writer has observed. Thus it seems evident that adverse conditions of either soil or climate lead to limitation of species. On the other hand, optimum conditions of soil and climate strongly favour the maintenance of numerous species, with a consequent complex species constitution.

The principal plant families well represented in northern rain forests by numbers and variety of species are the Myrtaceæ, Lauraceæ, Elæocarpaceæ, Rutaceæ, and Proteaceæ, and the chief economic woods of the northern forests are drawn from these families. Cabinet woods rank high in the scale of rain-forest products. The silky oak woods are included in the Proteaceæ and North Queensland walnut bean is supplied by *Endiandra Palmerstonii* of the Lauraceæ. *Flindersia Brayleyana* of the Rutaceæ yields the Queensland maple of commerce.

In North Queensland, the kauri pines (*Agathis Palmerstonii* and *Agathis microstachya*) are also important economic trees which produce a very serviceable softwood. They are magnificent trees, with imposing column-like stems and dark-green foliage crowns. In recent years, many of these trees have been removed in logging operations. The specimens seen during the course of the writer's visits were chiefly on the steep, forest-clad slopes of the Barron Gorge, on the mountain sides above the Cairns water-supply intake, and on the margins of Lake Barrine.

One of the commonest trees in the lowland rain forests is the milky pine (*Alstonia scholaris*). This tree is characterised by a strongly fluted, channelled, or angular stem and a pale bark which exudes a copious, milky sap when cut. The acacia cedar (*Albizzia Toona*) is also found in lowland rain forests, and often in foothill forests as well. It is often seen, too, as a spreading, dark-foliaged, bushy tree in open eucalyptus forests. It furnishes a good cabinet wood. The black bean (*Castanospermum australe*) is also frequently found in lowland and foothill rain forests. The largest trees of this species seen by the writer were located on the foothills of Mount Spec. This species, as is well known, produces a cabinet wood of exceptional appearance. *Cryptocarya Mackinnoniana* is a very common species of the rain forests of the Eungella Range, Mount Spec, and the Atherton Tableland. It is not one of the largest trees of the forests.

Lawyer palms are common in the rain forests of tropical Queensland. The common species in the Eungella Range and Mount Spec forests is *Calamus australis.*

Some of the most luxuriant rain forests of tropical Queensland are located on tablelands and mountain ranges. Very favourable soil conditions may be responsible for this distribution of very dense rain forest on highlands. The soils of the Atherton Tableland rain forests are derived to a great extent from basaltic rocks. The rain forests of the Eungella Range and Mount Spec are located principally upon soils which owe their mineral origin to the disintegration of granite or granodiorite. Granitic rocks also underlie the soils of the rain forests of the Bellenden-Ker Range.

One of the principal factors, or perhaps the principal factor, in the distribution of rain forests is a high rainfall. This fact is well exemplified in the distribution of luxuriant rain forests in tropical Queensland. There are two areas of North Queensland which are characterised by the presence of comparatively large tracts of luxuriant rain forest. The more southern of these areas is located between Carmilla on the south and Proserpine on the north. Within this area is the Eungella Range. The average annual rainfall varies from 50 inches at Carmilla to 66 at Mackay and 65 inches on the Eungella Range. The more northern area is located roughly from a point a little south of Ingham right up to Cairns. Some of the annual average registrations in this area are—Ingham, 79 inches; Cardwell, 82 inches; Innisfail, 142 inches; and Cairns, 89 inches.

THE RAIN FORESTS OF THE ATHERTON TABLELAND.

The rain forests of the Atherton Tableland are probably richer in species than those of the Eungella Range and Mount Spec. The basaltic soil of much of the Atherton rain forests is rich in mineral plant foods, and this is most likely connected with the diversity of species. Varieties of *Tarrietia argyrodendron* are often plentiful in the Atherton Tableland forests. These varieties are always buttressed, and their bark is often somewhat lined or wrinkled longitudinally. The wood always shows conspicuous and large rays, though not so large as those of many of the silky oaks. Varieties of *Tarrietia argyrodendron* are often very common in lowland and foothill rain forests in the vicinity of Cairns.

A considerable development of timber-tree species of the family Proteaceæ is found. The following species of this family were found by the writer in the vicinity of the forestry station at Gadgarra:—*Cardwellia sublimis, Carnarvonia araliæfolia, Lomatia fraxinifolia, Helicia diversifolia,* and *Darlingia spectatissima.* The red penda (*Xanthostemon pubescens*) and blood-in-the-bark (*Ceratopetalum succirubrum*) are common trees at Gadgarra.

One of the most common species in Atherton Tableland rain forests is the silky oak (*Cardwellia sublimis*).

Owing to the difficulty of collecting them, the writer did not bring back specimens of lawyer vines (*Calamus* sp.) from the Atherton forests. The species there are the largest seen by him.

A comparatively small tree, *Villaresia Smythii,* is found in the Atherton Tableland forests, and is easily recognised by its light-coloured corky bark, often crooked stem, and conspicuous wood rays.

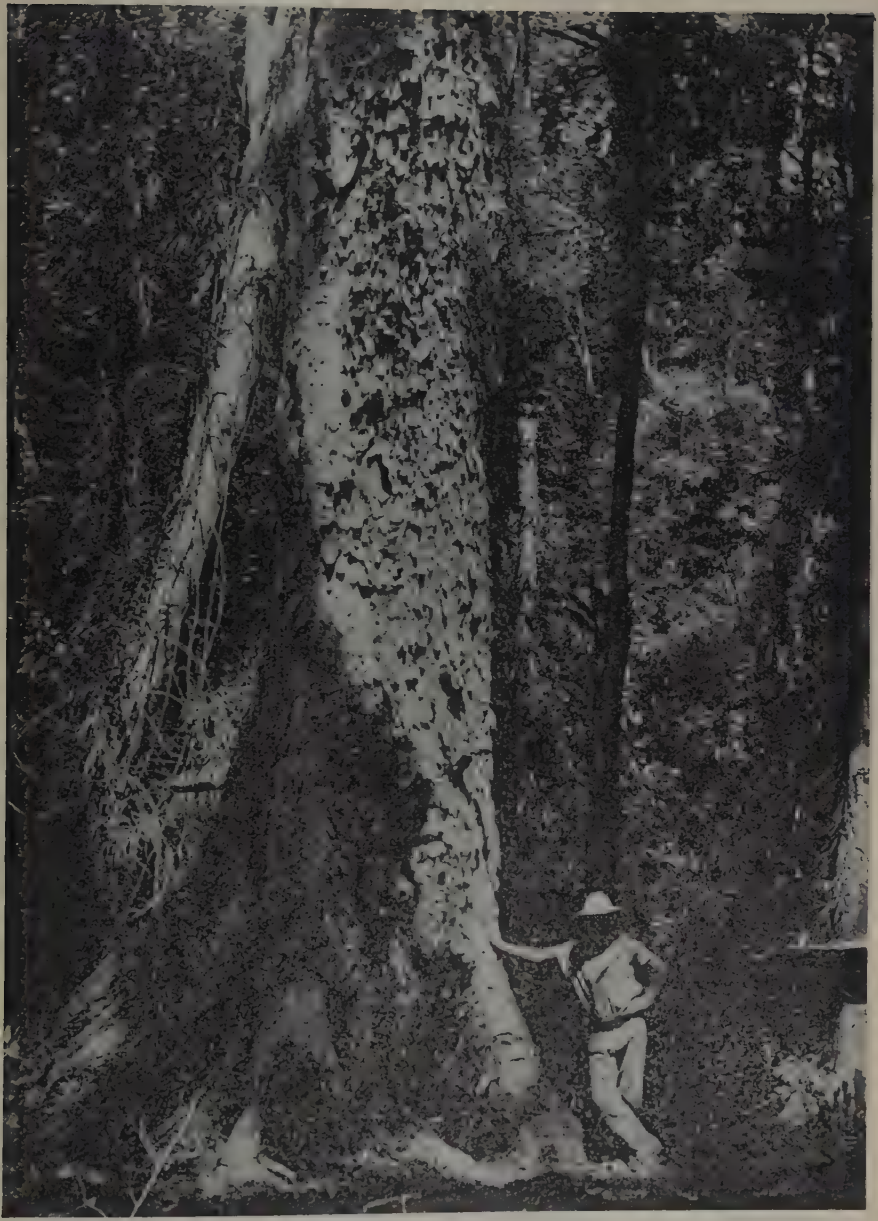
The cadaga (*Eucalyptus Torelliana*) is a somewhat exceptional member of the eucalypts, as it grows in parts of the rain forest on the ranges. It does, however, seem to prefer locations towards the margins of the forests. The cadaga has often some hard persistent bark at the base of the stem, but for most of its length the stem is covered by a smooth pale or green-coloured bark. It is a large tree. Some good examples of it can be seen from the train as it ascends the Barron Gorge on the way from Cairns to Kuranda.

THE MOUNT SPEC RAIN FORESTS.

In the parts of the Mount Spec rain forests seen by the writer much of the undergrowth consisted of young trees of *Cardwellia sublimis* and *Kermadecia Bleasdalii.* These are silky oaks, and belong to the family Proteaceæ. The young trees of these species, measuring from 1 foot up to 8 feet in height, are rather impressive with the beauty of their foliage. The leaves are pinnate and of several leaflets; their appearance and arrangement possess a pleasing and symmetrical effect. On the other hand, the stems and branches of these two species, as well as of some other Proteaceæ, are often crooked or otherwise asymmetrical.

Some of the common trees in the Mount Spec rain forest are—*Villaresia Smythii, Eugenia hemilampra,* the so-called soft ghittoe (*Xanthophyllum Macintyrii*), *Cryptocarya Mackinnoniana, Balanops australiana.* The family Elæocarpaceæ is well represented. The following species were noted:—*Elæocarpus sericopetalus, E. largiflorens,* and a species very like *E. obovatus, Sloanea Macbrydei.* The family Lauraceæ is also very well represented. Representatives of this family included *Litsea ferruginea,* var. *lanceolata, Beilschmiedia obtusifolia, Endiandra dichrophylla, E. glauca, Cryptocarya angulata, C. corrugata, C. cinnamomifolia.* A deeply corrugated or wrinkled surface of the sapwood was well shown in *Cryptocarya angulata* and *C. corrugata.*

An acacia (*Acacia aulacocarpa*) is common in the rain forest on some of the drier ridges of Mount Spec. This acacia shows a considerable degree of adaptation to rain-forest conditions, but it has scarcely attained as much of the characteristics of typical rain-forest trees as *Acacia Bakeri,* which is common in some of the rain forests of Southern Queensland and Northern New South Wales.



[*Photo.: W. D. Francis.*

Plate 110.

A LARGE RED CEDAR TREE (*Cedrela Toona* var. *australis*) ON THE EUNGELLA RANGE.—In 1922 there were large numbers of these trees on the Eungella Range. *Freycinetia excelsa*, a climbing Pandanaceous plant, is shown on the right and left sides of the picture.

THE RAIN FORESTS OF THE EUNGELLA RANGE.

A large proportion of the undergrowth in parts of the rain forests of the Eungella Range is composed of *Drimys dipetala* and *Sloanea Langii*. The Eungella gums, *Eugenia hemilampra* and *Eugenia* sp., are important trees. Their timber was used by the settlers as a substitute for hardwood. The red Eungella gum is *Eugenia hemilampra*. It is doubtful whether the white Eungella gum is specifically different in a botanical sense from red Eungella gum. In October, 1922, there were a large number of red cedar trees, *Cedrela Toona* var, *australis* in the rain forest. Suitable access for timber hauling was not available up to that time, and the area was almost in its natural state. One of the common trees is a species which is known in Southern Queensland as black jack, *Tarrietia actinophylla*. This is very closely allied to the Booyong or Queensland hickory (*Tarrietia argyrodendron*). The black jack and the booyang resemble each other in appearance. The black jack like the booyong, is always buttressed, and often has a slightly furrowed bark and at times a scaly bark. The stems of both species above the buttresses are mostly fairly cylindrical, and they possess a long length of stem free of branches. A few trees of the booyong were observed in western portions of the Eungella Range.

A large and common species in the area is *Elæocarpus foveolatus*. When looked at from the ground beneath the trees the foliage is brown in appearance. This species was very frequent at an altitude of about 3,000 feet on the track leading to Mount Dalrymple. The trees mostly have a light-grey fairly smooth bark and a buttressed stem.

Another tree which was fairly common was found to be a new species. It was named *Cryptocarya corrugata* by White and Francis. It has a very corrugated sapwood surface, and on that account was called the washing-board tree.

The bangalow palm (*Archontophœnix Cunninghamiana*) was common along the track leading to Mount Dalrymple at about 3,000 feet. In parts of the forest these palms were a predominant constituent. The northern bangalow palm (*Archontophœnix Alexandræ*) appeared to be comparatively rare in the upper parts of the range, although it was seen in the gorges of the foothills.

On the roadside leading up to the Eungella Range, *Trema amboinensis* was plentiful up to an altitude of about 1,200 feet. This species is a tree attaining a height of about 50 feet and a stem diameter of about 15 inches. The wood is fairly soft to cut and the heartwood is pinkish in colour.

The common epiphytic fig. is *Ficus destruens*. This species also occurs in the rain forests of Mount Spec.

RAIN-FOREST TREES.

Family PODOCARPACEÆ.

Podocarpus amarus Blume. Black pine. Stem straight and cylindrical, without buttresses; 76 feet high, 2 feet 2 inches stem diameter. Bark very dark brown, somewhat scaly. When the bark is cut it is reddish brown and measures ⅜ inch thick. The fruit is bright red, nearly globose or slightly oval, and measures ¾-1 inch diameter. The leaves are placed alternately on the branchlets. Mount Spec and Atherton Tableland.

[*Photo.: W. D. Francis.*

Plate 111.

Trema amboinensis.—Sometimes called Pencil Cedar. It is allied to the Peach-leaved Poison Bush. Tree on the road up the Eungella Range. The tree on left also belongs to this species.

Family ARAUCARIACEÆ.

Agathis Palmerstonii F. M. Bailey and **Agathis microstachya** J. F. Bailey and C. T. White. The North Queensland kauri pines. It seems doubtful now whether these two species are quite distinct. The North Queensland kauri pines are very characteristic trees, and once seen they are not likely to be confused in North Queensland with other Australian trees. They attain 160 feet in height and 8 or even 9 feet in stem diameter. The stem is unbuttressed and rounded. The bark is generally brown in colour and is shed in roundish scales, a variable number of which remain *in situ* for some time. These scales, where they are present in numbers, give the bark a scaly appearance. The North Queensland species in the field almost exactly resemble the South Queensland species which is illustrated in "Australian Rainforest Trees," p. 46.

Family BALANOPSIDACEÆ.

Balanops australiana F. v. M. Attaining 70 feet in height and 2 feet 6 inches stem diameter. A tree with a bulky stem without buttresses. Bark grey, often with prominent corky pustules ¼-½ inch across. Often the bark shows transverse ring-like markings, which extend right round the stem. When cut the bark is biscuit brown towards the outside and pinkish or reddish brown towards the sapwood. The bark measured ¼-⅜ inch thick on tree 60 feet high and 16 inches stem diameter, and 1 inch thick on a tree 70 feet high and 2 feet 6 inches stem diameter. Sapwood creamy white. Mature wood nearly white or cleam coloured when first cut, very finely grained, the pores (vessels in cross section) and rays only visible with good lens magnifying eight diameters or more. The leaves are placed alternately on the branchlets. Eungella Range, Mount Spec, Murray Upper (west of Cardwell), Rockingham Bay, Bellenden-Ker Range, and Palm Island.

Family PROTEACEÆ.

Helicia diversifolia C. T. White. White oak. Attaining 60 feet in height and 1 foot stem diameter. Stem somewhat flared out at base, but not prominently buttressed. Bark brown, with numerous small lenticels about size of pin's head. When cut the bark is greenish yellow towards outside, brownish towards middle, and pale towards sapwood. Sapwood white. Heartwood nearly white or flesh-coloured, with prominent rays. Leaves are placed alternately on the branchlets. The leaves are undivided (mostly on large trees), toothed or divided (often on young trees or coppice shoots) and mostly have a fine coating of brown hairs on the underside. Atherton Tableland.

Kermadecia Bleasdalii. Benth. and Hook. A silky oak. Few of the trees seen exceeded 40 feet in height and 7 inches in stem diameter. Stem often somewhat irregular, with a strong tendency to asymmetry and occasional crookedness. The stem is without prominent buttresses. Bark brown to grey, somewhat rough, with small pustules. When the bark is cut it is light brown or pinkish in colour and measures ⅛ inch thick on a tree 40 feet high and 7 inches stem diameter. Sapwood pale. Heartwood pinkish brown, with very prominent rays. The leaves are placed alternately on the branchlets, and consist of several leaflets (pinnate). The leaflets have prominent teeth on their margins. Dallachy, who collected the specimens from which the species was named, described the species as "a small but beautiful tree." While on Mount

Spec the writer was struck by the beauty of its foliage. The young trees of 1-8 feet in height are very common in the rain-forest undergrowth on Mount Spec. Young trees of *Cardwellia sublimis* are also common there. The foliage of young trees of *Cardwellia sublimis* (also of Proteaceæ) is also strikingly beautiful. The stem and branch asymmetry of *Kermadecia Bleasdalii* is also evident in several other members the Proteaceæ such as *Stenocarpus sinuatus* and in a less degree in *Cardwellia sublimus.* Rockingham Bay (Dallachy), Eungella Range (W.D.F.) and Mount Spec (W.D.F.).

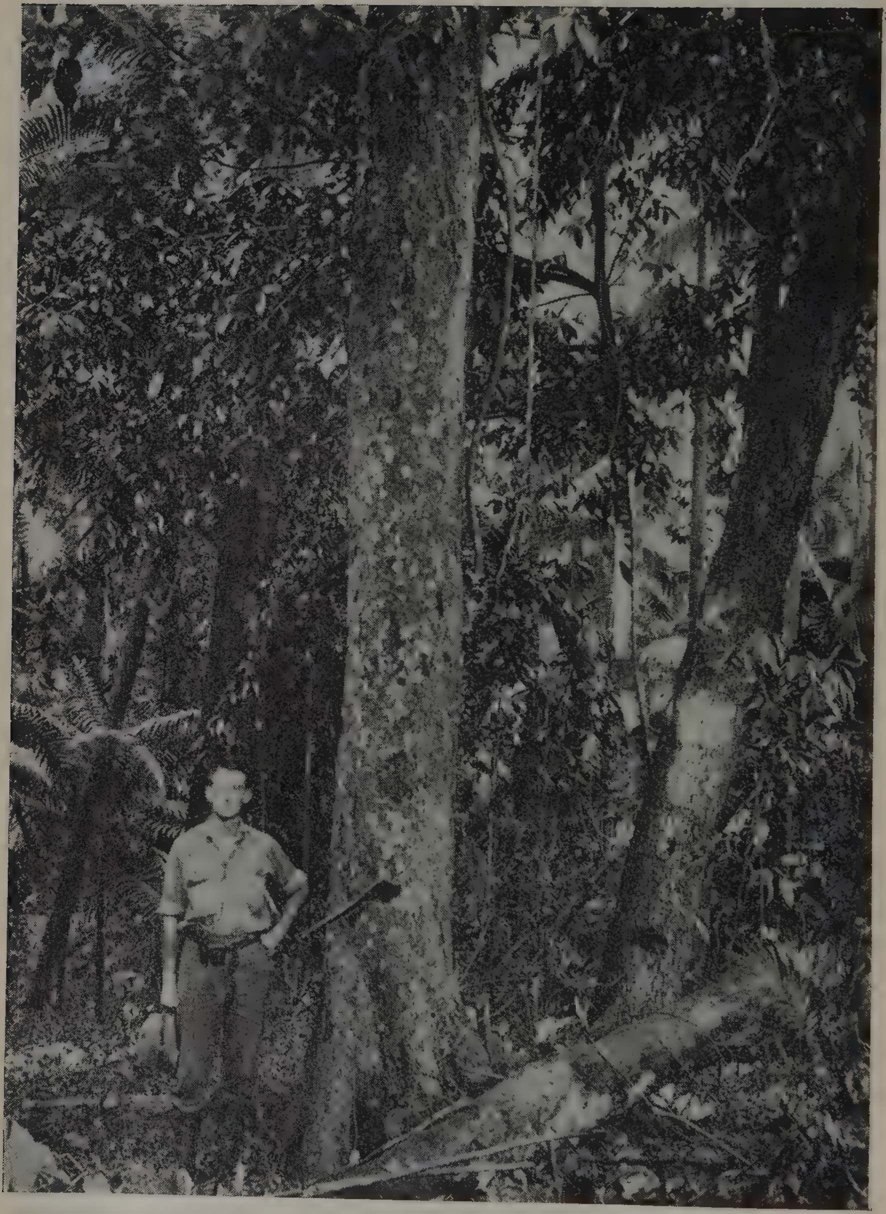
Carnarvonia araliæfolia. F. v. M. Red oak. Attaining about 100 feet in height and 2 feet in stem diameter. Stem scarcely buttressed. The few trees seen were generally straight and fairly cylindrical in the stem. Bark dark brown, rough with numerous pustules. When the bark is cut it is biscuit brown and measures $\frac{1}{2}$ inch thick on tree of above size. Sapwood white; heartwood reddish brown. The leaves are placed alternately on the branches. The leaves are compound and consist of 3-5 leaflets arranged at the end of the leaf. Sometimes one or more of the leaflets are again divided or lobed. Atherton Tableland.

Buckinghamia celsissima F. v. M. A silky oak. Attaining 90 feet in height and 2 feet in stem diameter. Base of stem flanged into thick obscure buttresses. Stem in the single large tree seen somewhat irregular. Bark dark brown, rough and hard, in parts scaly, and in other parts with scattered rough pustules. When the bark is cut it is very dark red and measures $\frac{5}{8}$ inch thick on a tree of above dimensions. Sapwood almost white. Heartwood very hard and tough, almost pink in colour. The leaves are placed alternately on the branchlets. Mountains near Rockingham Bay (Dallachy), Mount Spec, Atherton Tableland, and Mount Molloy. Planted as an ornamental tree in Brisbane streets.

Darlingia spectatissima F. v. M. Attaining 100 feet in height and 18 inches stem diameter. Buttresses at base of stem small or absent. Stem often irregular and crooked (see remarks under *Kermadecia Bleasdalii*). Bark dark brown with scattered fine pustules each of which measures up to $\frac{1}{12}$ inch across. Bark when cut brown, measuring $\frac{1}{4}$ inch thick on a tree of above size. Sapwood pale. Heartwood pinkish on outside, red-brown inwards, the rays being very prominent. The leaves are placed alternately on the branchlets. The leaves are often very large and deeply cut into large segments. Yarrabah, Johnstone River, Rockingham Bay, Atherton Tableland, and Mount Spec.

Cardwellia sublimis F. v. M. Silky oak. Bull oak. Attaining 100 feet in height and 5 feet in stem diameter. Stem without buttresses. Mostly this is a bulky or large stemmed species. Sometimes the stems are irregular in shape. Bark mostly grey, dark grey, or brown, with many scattered pustules. In the very large trees the bark is inclined to be longitudinally cracked or is even noticeably fissured. When cut the bark is biscuit brown, and is often darker towards the outer surface, $\frac{5}{8}$-$\frac{3}{4}$ inch thick on tree of above size. The leaves are placed alternately on the stem. Generally the leaves are very large and are divided into several or numerous segments or leaflets. Very common on the Atherton Tableland and at Mount Spec.

Lomatia fraxinifolia F. v. M. A silky oak. The one tree seen was about 60 feet high and 1 foot stem diameter. The stem was rather crooked and not prominently buttressed. Bark brown, with small pustules arranged in longitudinal lines. When cut the bark was ochre



[*Photo.: W. D. Francis.*

Plate 112.

NATIVE NUTMEG (*Myristica insipida*).—A tree in rain forest at Netherdale, at foot of Eungella Range.

brown and measured ¼-⅜ inch thick on tree of above dimensions. Heartwood pinkish in colour. Leaves placed alternately on the branchlets. Each leaf is composed of several leaflets. The leaflets generally have toothed edges. Atherton Tableland and Mount Bellenden-Ker.

Family OLACACEÆ.

Apodytes brachystylis F. v. M. The trees seen on Mount Spec only attained a height of 30 feet and a stem diameter of about 8 inches. Stems not buttressed. Often coppice shoots and many branches arise from base of stem. Bark dark brown or nearly black. When the bark is cut it is pinkish brown and measures ⅜ inch thick on a tree of above size. Wood light brown in colour. The trees were in full flower on Mount Spec in November. The flowers are white. Johnstone River, Mount Spec, Atherton Tableland, Herberton Range, and Rockingham Bay.

Family HIMANTANDRACEÆ.

Galbulimima baccata F. M. Bailey (*Himantandra baccata* L. Diels). In "Australian Rain-forest Trees" the writer used *Himantandra baccata* as the name for this species. However, while at the Royal Botanic Gardens, Kew, in 1930, he had a discussion with Dr. T. A. Sprague on the subject. Dr. Sprague stated that according to the rules of nomenclature F. M. Bailey's name, *Galbulimima baccata,* should stand. Trees of this species attain 100 feet in height and 3 feet in stem diameter. The stem at the base tends to flange out into obscure or thick buttresses. The bark is yellowish brown and marked by occasional small pustules; in places there are slight curved or concentric depressions left by scales of shed bark. When cut the bark is brown in colour with a green outer layer. The odour of the cut bark is decidedly resinous. The bark measures ⅜ inch thick on a tree of 18 inches stem diameter. The wood is pale or white. The leaves are placed alternately on the branchlets. The underside of the leaves and young green parts are partly covered by minute copper- or silver-coloured, wheel- or star-shaped scales similar in appearance and structure to the scales of Tarrietia. Apparently rare; Eumundi in South Queensland to the Atherton Tableland.

Family MYRISTICACEÆ.

Myristica insipida R.Br. Attaining 90 feet in height and 2 feet stem diameter. Stem fairly regular and slightly or not at all buttressed. Bark brown, sometimes scaly or with roundish shallow depressions left by fallen scales. When cut, brown towards outside, red inwards, exuding often much red sap. The bark measures ⅜-½ inch thick on tree of above size. The red-coloured sap often exudes from the vessels of the sapwood when it is cut. Wood pale. From Carmilla between Mackay and St. Lawrence to the Daintree River.

Family MONIMIACEÆ.

Daphnandra aromatica F. M. Bailey. The one tree seen attained 80 feet in height and 1 foot in stem diameter. Stem scarcely buttressed. Bark grey, with fairly large pustules measuring up to ¼ inch across. When the bark is cut it is very light brown and turns dark or biscuit brown on exposure. The bark measures ⅜ inch thick on a tree of above size. Wood yellow. There is a very strong odour of sassafras in the bark and wood when cut. The leaves are arranged opposite to each other on the branchlets. The margins of the leaves mostly have more or less distinct teeth. Johnstone River, Atherton Tableland, and Murray Upper.

Daphnandra Dielsii Perkins (?). The determination of this tree is doubtful as the material of it does not allow its separation satisfactorily from *Tetrasynandra laxiflora.* Attaining 60 feet in height and 9 inches in stem diameter. Bark grey with small pustules often arranged in longitudinal rows. Bark and wood very bright yellow. The leaves are arranged opposite to each other on the branchlets and have small teeth on their margins. Atherton Tableland.

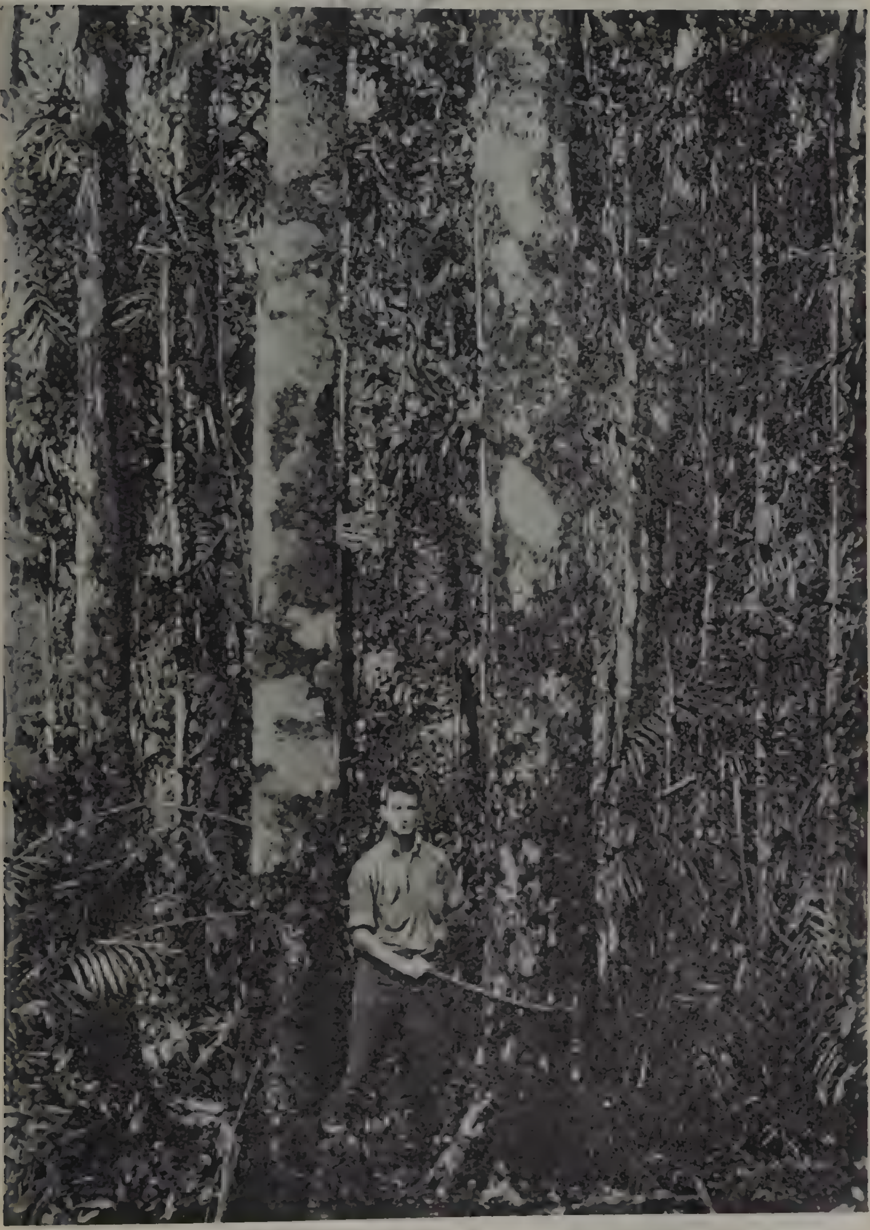
Family LAURACEÆ.

Cryptocarya Mackinnoniana F. v. M. Attaining 90 feet high and 15 inches stem diameter, but the trees are often much smaller than this. Occasionally there are buttresses at the base of the stem. Bark fairly smooth, often brown in colour. When cut biscuit brown, ¼-⅜ inch thick on tree of above size. Wood light-coloured; transverse sections show concentric lines of soft tissue and some oblique lines of soft tissue joining the vessels. The leaves are arranged alternately on the branchlets. The leaves are often large and have generally very strongly raised veins on their undersides. Very common in the rain-forests of Mount Spec and parts of Atherton Tableland. Eungella Range, Mount Spec, Atherton Tableland to Cape York.

Cryptocarya cinnamomifolia Bentham. The trees seen on Mount Spec attained 60 feet in height and 10 inches stem diameter. Stem somewhat buttressed at base. Bark grey or greenish grey with fine but prominent longitudinal wrinkles or fissures. The bark when cut is reddish brown and measures ¼ inch thick on tree of above size. Sapwood surface yellowish, finely but prominently corrugated. The leaves are placed alternately on the branchlets. A feature of the leaves are the longitudinal nerves one on each side of the midrib, which join the midrib a little above the base of the leaf. The leaves are whitish on the underside. Herberton Range and Mount Spec. Recorded from Rockingham Bay by Bentham.

Cryptocarya corrugata White and Francis. A washing-board tree. Attaining 90 feet in height and 2 feet stem diameter. Stem not prominently buttressed. Bark brown sometimes longitudinally corrugated on the outside and sometimes showing roundish depressions left by fallen scales. Bark when cut reddish or at times biscuit brown, ½ inch thick on tree of above size. Sapwood surface often very strongly longitudinally corrugated. The leaves and fruit are illustrated by a plate in the Proceedings of the Royal Society of Queensland, Vol. 37, p. 165, 1926, where the species is described. The leaves are entire and are placed alternately on the branchlets. Eungella Range and Mount Spec.

Cryptocarya pleurosperma White and Francis. Attaining 90 feet high and 18 inches stem diameter. Stem without conspicuous buttresses. Bark grey with rows of small pustules. When the bark is cut it is biscuit brown in colour and measures ⅜ inch thick on tree of above size. Wood pale or almost white. The leaves are generally placed alternately



[*Photo.: W. D. Francis.*

Plate 113.

CORDUROY OR WASHING-BOARD TREE (*Cryptocarya corrugata*), EUNGELLA RANGE.—The tree is characterised by the corrugated or longitudinally furrowed surface of the sapwood. The palm-like leaves belong to the common Lawyer Vine of the area, *Calamus australis.*

on the branches; they have a conspicuous longitudinal nerve on each side of the midrib beginning from near the base of the leaf blade and ending towards the apex. The numerous strong ribs of the round, almost walnut-sized seed are characteristic. There is a figure of the leaves and fruit in White and Francis' paper in the Proceedings of the Royal Society of Queensland, Vol. 35, p. 78, 1924. Bellender-Ker Range, Atherton Tableland, and Johnston River.

Cryptocarya angulata C. T. White. Attaining 100 feet in height and 15 inches in stem diameter. Stem slightly buttressed at base, otherwise fairly symmetrical. Bark brown, not prominently scaly or fissured in the trees seen. When the bark is cut it is biscuit brown and measures $\frac{5}{8}$ inch thick on tree of above size. Sapwood surface deeply corrugated like the surface of a washing board. Wood somewhat yellow, turning brownish yellow on exposure. The tissue of the wood when viewed in cross section shows distinctly the disturbances associated with the sapwood surface corrugations. The leaves are placed alternately on the branchlets. Eungella Range, Mount Spec, and Atherton Tableland.

Beilschmiedia Bancroftii J. F. Bailey and C. T. White. (*Cryptocarya Bancroftii* F. M. Bailey). Yellow walnut. Canary ash. Attaining 100 feet in height and 3 feet stem diameter. Stem sometimes crooked or irregular, without conspicuous or large buttresses. Bark brown, somewhat rough with small excrescences or pustules. When cut the bark is brown; middle layer of bark is reddish brown, outermost layer becomes dark towards surface and the innermost layer is pale towards the sapwood. The bark measures $\frac{3}{8}$ inch thick on tree of above size. Wood yellow, often with darker streaks. The leaves are placed alternately on the branchlets. Atherton Tableland.

Endiandra dichrophylla F. v. M. Attaining 90 feet in height and 20 inches in stem diameter. Stem with thick obscure buttresses at the base. Bark grey or brown with numerous fine longitudinal wrinkles. When the bark is cut it is pale brown or biscuit brown with a greenish white or clear white cambium layer which exudes a clear, somewhat sticky sap. The bark measures $\frac{3}{8}$ inch thick on a tree of above size. Sapwood surface pale cream. Heartwood pale or nearly white. Leaves placed alternately on the branchlets. Russell River, Atherton Tableland, and Mount Spec.

Endiandra Palmerstonii White and Francis (*Cryptocarya Palmerstonii* F. M. Bailey). North Queensland walnut, walnut bean. Attaining 120 feet in height and 4-5 feet in stem diameter. Stem without buttresses or with comparatively small ones. Bark grey or at times brown, with fairly fine longitudinal wrinkles which are scarcely deep and wide enough to be called fissures. When the bark is cut it is reddish brown and measures $\frac{3}{8}$ inch thick on a tree with a stem diameter of 3 feet. Sapwood white or pale and abundant; heartwood dark brown. Leaves placed alternately on the branchlets. Atherton Tableland and Russell River.

Litsea ferruginea Benth. & Hook. var. *lanceolata* Meissn. Attaining 80 feet high and 14 inches stem diameter. Stem slightly buttressed.

Bark brown with a few pustules. When the bark is cut it is light creamy brown, and measures ¼ inch thick on a tree of above dimensions. Wood yellow or greenish yellow. Fruit red when ripe. The leaves are generally placed alternately on the branchlets. Fraser Island, Family Island, near Rockingham Bay (Dallachy), and Mount Spec.

Family SAXIFRAGACEÆ.

Polyosma alangiacea F. v. M. Attaining 60 feet in height and 7 inches stem diameter. Bark dark grey, longitudinally fissured. When the bark is cut it is pale creamy brown towards the outside and white inwards. Sapwood surface pale cream colour. Wood light brown in colour. The leaves are arranged opposite to each other on the branchlets. Ranges about Rockingham Bay (Dallachy), Mount Spec, and Atherton Tableland.

Polyosma rhytophloia White and Francis. A small tree attaining about 35 feet in height and 7 inches stem diameter. Stem generally straight or nearly cylindrical. Bark greenish grey in colour with lighter-coloured longitudinal wrinkles or fissures. When cut the bark is brown. Leaves are opposite on the stem and their margins are toothed. This species is described in the Proceedings of the Royal Society of Queensland, Vol. 37, p. 158, 1926, where there is a plate illustrating the leaves, flowers, and fruit. Kirrima and Murray Upper (West of Cardwell), Atherton Tableland, and Eungella Range.

Family PITTOSPORACEÆ.

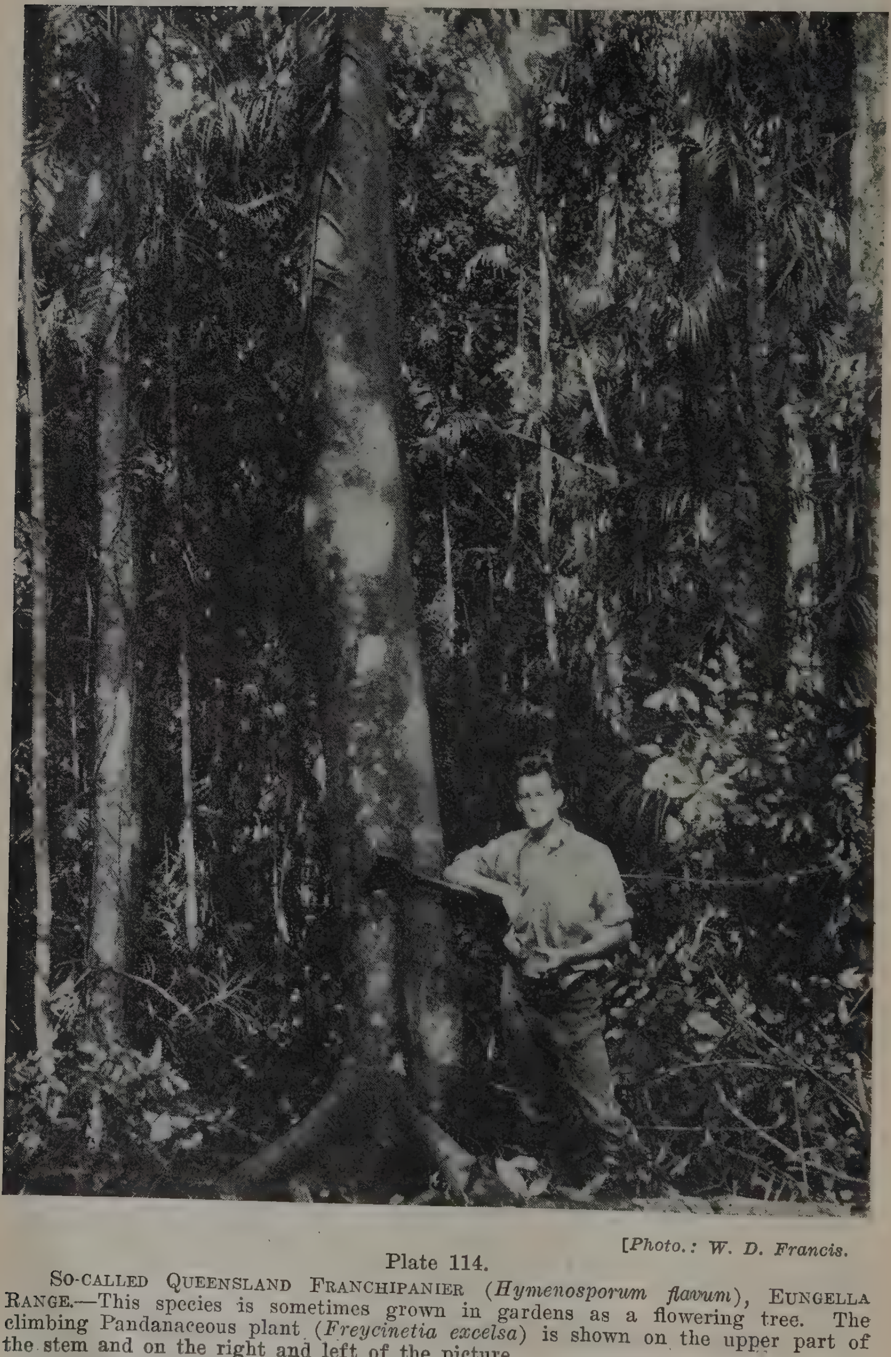
Hymenosporum flavum F. v. M. Attaining 80 feet in height and 15 inches stem diameter. The surface roots are at times somewhat flattened and resemble small buttresses. Bark grey or brown, sprinkled with transversely elongated lenticels. When the bark is cut it is seen to be cream-coloured or white and measures ¼ inch thick on a tree of above dimensions. Surface of sapwood cream-coloured. The leaves are placed alternately on the branches. The tree is conspicuous on account of its large, trumpet-shaped, white or yellow very fragrant flowers. Hunter River, New South Wales, to Atherton, North Queensland.

Family CUNONIACEÆ.

Ceratopetalum succirubrum C. T. W. Blood-in-the-bark. Attaining 90 feet in height and 20 inches stem diameter. Stem buttressed at base, otherwise mostly straight and almost cylindrical. Bark grey or light grey, fairly smooth. When the bark is cut outer bark is sooty brown and the inner bark red or reddish brown; a red sap exudes from the cut bark. The bark measures ¼-⅜ inch thick on a tree of above size. The leaves are placed opposite one another on the branchlets. Each leaf consists of three, or occasionally two or one, leaflets; the leaflets generally have more or less toothed edges. Atherton Tableland and Mount Bartle Frere.

Family LEGUMINOSÆ, Sub-Family MIMOSOIDEÆ.

Acacia aulacocarpa F. v. M. Attaining 60 feet in height and 2 feet stem diameter. The base of the stem shows a tendency to form flanges which are like thick obscure buttresses. Bark brown, fissured.



[*Photo.: W. D. Francis.*

Plate 114.

SO-CALLED QUEENSLAND FRANCHIPANIER (*Hymenosporum flavum*), EUNGELLA RANGE.—This species is sometimes grown in gardens as a flowering tree. The climbing Pandanaceous plant (*Freycinetia excelsa*) is shown on the upper part of the stem and on the right and left of the picture.

When the bark is cut it is pinkish brown and measures ¼-⅜ inch thick on a tree of above size. Sapwood pale yellow. Leaves placed alternately on the stem. The phyllodes, which take the place of leaves, are unequal sided or have a tendency to be sickle-shaped. There are several parallel longitudinal nerves in the leaf-like phyllodes. This species is not commonly found as a constituent of a rain-forest. It is found chiefly on the dry ridges of the Mount Spec rain-forests. From observations at Mount Spec the writer is inclined to think that it has scarcely attained the typical rain-forest characteristics shown by *Acacia Bakeri* in Southern Queensland rain-forests. Instances of species of Acacia assuming the qualities of rain-forest tree types are rare in Australia, and, so far as known, are almost confined to *Acacia Bakeri* and *Acacia aulacocarpa*. This wattle is common in coastal localities of Northern and Southern Queensland.

Albizzia Toona F. M. Bailey. Mackay cedar, Acacia cedar. Attaining 90 feet high and 2 feet stem diameter. Stem not prominently buttressed. Bark grey or brown, scaly in parts, sometimes showing roundish or curled irregular depressions from which scales of bark have been detached. When cut the bark is pink. The leaves are mostly placed alternately on the branchlets. The leaves are doubly pinnate like those of Acacia, the leaflets being very small. The trees grow in the open Eucalyptus forests as well as in the rain-forests. When growing in the open they form spreading trees with dark dense heads of foliage. In the southern portion of its range the species does not appear to ascend to the higher altitudes, but is common in lowland forests. From about 50 miles south of Mackay to Endeavour River.

Family RUTACEÆ.

Evodia Bonwickii F. v. M. Attaining 100 feet in height and 2 feet stem diameter. Stem slightly buttressed. Bark brown with small pustules which are often arranged in indistinct, fine longitudinal cracks. When the bark is cut it is reddish brown and measures ¾-1 inch thick on a tree of above size. Wood almost white and soft. The leaves are large and fairly soft in texture. They are arranged opposite to each other on the branchlets. Each leaf consists of three leaflets placed at the ends of the leaf stalks. Mount Spec and Atherton Tableland.

Evodia Bonwickii F. v. M. Attaining 50 feet in height and 9 inches stem diameter. Stem not buttressed, often straight and fairly cylindrical. Bark grey, marked by fine longitudinal wrinkles and fine pustules. The bark when cut is light brown and measures ¼ inch thick on a tree of above size. Wood nearly white, soft, with wavy lines of soft tissue. Atherton Tableland, Rockingham Bay (Bentham) and Johnstone River.

Evodia vitiflora F. v. M. Attaining 90 feet in height and 18 inches stem diameter. Stem without prominent buttresses. The symmetry of the stem is at times somewhat broken by irregular undulations, bumps, or obscure protuberances. Bark grey with fine cracks or longitudinal fissures and sometimes with a tendency to scaliness. In younger or smaller trees the longitudinal fissures and scales are not much in evidence. When cut the bark is cream-coloured or very light brown with sometimes a pinkish tint under the outer bark; the cambium layer is prominently white. The bark measures ⅜ inch thick on a tree of the above size. The leaves are situated opposite to each other on the branchlets; each leaf consists of three leaflets attached at the ends of the leaf stalks. Tweed River, Johnstone River, Dunk Island, Atherton Tableland, Mount Spec, and Rockingham Bay (Dallachy).

Acronychia acidula F. v. M. Attaining 90 feet in height and 18 inches stem diameter. Stem without prominent buttresses. Often or at times the stems have numerous slight protuberances or indistinct swellings on them. Bark grey with numerous transverse rings. When cut the bark is fragrant and reddish brown, becoming paler towards the sapwood. The bark measures ⅜-½ inch thick on a tree of above size. The wood is whitish or pale yellow in colour and soft in texture. The leaves are placed opposite to each other on the branchlets. Fruit white or pale cream with an acid and somewhat lemon-like flavour. This species is known as wild lemon on the Atherton Tableland, where it is accused of causing dietetic trouble in pigs. Atherton Tableland and Rockingham Bay.

Halfordia scleroxyla F. v. M. Ghittoe. Attaining 80 feet in height and 18 inches stem diameter. Stem not conspicuously buttressed. Bark grey or light grey, slightly scaly or almost smooth. When the bark is cut it is yellow or yellowish brown and is paler towards the sapwood. There are numerous very fine but conspicuous concentric layers of tissue in the bark which are well seen in cross section when the bark is cut across and examined with a lens. Sapwood surface flesh-coloured. Wood pale or yellowish brown, very hard and tough. This species in the northern rain forests is very closely allied to *Halfordia drupifera* of the Southern Queensland and Northern New South Wales rain forests. In fact, the two species are remarkably alike in the field. There is a picture of the southern species in Francis' "Australian Rain-forest Trees," p. 172. Mount Spec, Atherton Tableland, and Rockingham Bay.

Flindersia Brayleyana F. v. M. Queensland maple. Maple silkwood. Attaining 100 feet in height and 4 feet stem diameter. Stem often fairly cylindrical, not prominently buttressed. Bark grey or slightly brown with fairly distinct longitudinal fissures. In very large trees of 3 to 4 feet stem diameter the longitudinal fissures are not so marked owing to the tendency to scaliness. When the bark is cut it is red towards the outer surface and flesh-coloured towards the sapwood. The bark measures ⅜-½ inch thick on a tree of 20 inches stem diameter and 100 feet in height. Sapwood white. The leaves are often very large, especially on young trees; they are pinnate and consist of several leaflets. The leaflets at times are large in comparison with a simple ordinary leaf. The leaves are placed opposite to each other on the branchlets. Atherton Tableland and Mount Spec.

Flindersia Bourjotiana F. v. M. A silver ash. Attaining 120 feet in height and 2 feet 6 inch stem diameter. Stem not buttressed. Bark grey, with numerous small corky pustules. When the bark is cut it is pinkish brown, becoming yellow towards the sapwood. The bark measures ⅝ inch thick on tree of above size. Wood yellowish white. The leaves are placed opposite each other on the branchlets. Each leaf consists of several leaflets which have the appearance of a simple leaf. Atherton Tableland.

Flindersia acuminata C. T. White. Putt's Pine or Paddy King's Beech. Attaining 80 feet in height and 20 inches stem diameter. Stem not buttressed, often straight and fairly cylindrical. Bark brown or grey, smooth or slightly wrinkled and slightly scaly. When the bark is cut it is brown and measures ⅜-½ inch thick on tree of above size. The leaves, as in other Flindersias, are generally opposite to each other on the branchlets and each leaf consists of several leaflets. Atherton Tableland.

Family BURSERACEÆ.

Canarium Muelleri F. M. Bailey. Queensland Elemi tree. Attaining 90 feet in height and 2 feet in stem diameter above buttresses. Buttresses large and prominent. Bark brown with a fair number of small pustules and some roundish depressions left by fallen scales. When the bark is cut it is very pale brown or almost cream-coloured, and measures ⅜ inches thick on a tree of above dimensions. The bark when cut or bruised exudes a whitish or cream-coloured resin with a strong odour of turpentine. Sapwood whitish in colour. The leaves are placed alternately on the branchlets and are composed of several leaflets, generally five or seven. Johnstone River, Atherton Tableland, and Mount Spec.

Family MELIACEÆ.

Dysoxylum Pettigrewianum F. M. Bailey. Spurwood. Spur mahogany. A tree attaining over 100 feet in height and 2 feet in stem diameter. Stem mostly prominently buttressed. The common names of the tree originate from these buttresses, which are often popularly known as spurs. Bark dark brown, marked with numerous pustules ⅛-¼ inch in diameter, often with large irregular scattered flakes or partly detached sheets of old bark. When the bark is cut it is bright pink beneath outer surface and flesh coloured inwards. The bark measures ¼ inch thick on a tree 60 feet high. Sapwood white. The leaves are placed alternately on the branchlets and consist of several leaflets. The trees seen reminded the writer very much of *Dissiliaria baloghioides* in the manner in which the bark is shed in large flakes or sheets. See illustration on page 200 of ''Australian Rain-forest Trees.'' Barron River, base of Bellender-Ker Range, and Atherton Tableland.

Dysoxylum oppositifolium F. v. M. The one tree seen at Mount Spec attained 60 feet in height and 16 inches stem diameter. The stem was not prominently buttressed. Bark greyish brown with fairly prominent pustules and large flakes of partly shed bark. When the bark is cut it is cream-coloured with a pinkish tint towards the outer bark. Sapwood white or nearly so. Heartwood inclined to be red. The fine concentric rings of soft tissue, or wood parenchyma, are prominent in the wood. The leaves are situated opposite to each other on the branchlets. Each leaf consists of several leaflets. Rockingham Bay, Johnstone River, foothills of Bellenden-Ker Range, Mount Spec, Atherton Tableland, and Endeavour River.

Synoum Muelleri C. DC. Northern scentless rosewood. Attaining 70 feet in height and 18 inches stem diameter. Stem with small and not prominent buttresses at the base. Stem sometimes rather irregular. Bark grey, scaly. When the bark is cut it is red or pink and measures ⅜-½ inch thick on a tree of above size. Sapwood nearly white. Heartwood dark red when first cut. The leaves are placed alternately on the branches; they are pinnate and consist of several leaflets. The species is extremely closely allied to the southern species, *Synoum glandulosum*. In fact the northern trees are so like the southern *Synoum glandulosum* that the pictures of the southern tree on pages 192, 193 of "Australian Trees" are quite useful in identfying the northern species. Atherton Tableland and Rockingham Bay.

Family POLYGALACEÆ.

Xanthophyllum octandrum (F. v. M.) Domin (*Xanthophyllum Macintyrii* F v. M.). Sometimes called Soft Ghittoe on account of its resemblance to *Halfordia scleroxyla.* The trees on Mount Spec attain a height of 70 feet and a stem diameter of 2 feet. Sometimes the stems are forked or twinned at the base and two or more stems arise from the same base. Generally the trees are without conspicuous buttresses. Bark grey or sometimes brownish and often with a yellow tint. The trees are mostly conspicuous by their grey or yellow-grey longitudinally wrinkled bark. When the back is cut it is deep yellow-brown and measures $\frac{3}{4}$ inch thick on a tree of above size. Wood yellow-brown when first cut. The leaves are placed alternately on the branchlets. Daintree River, Kamerunga (near Cairns), Johnstone River, Innisfail, Mount Molloy district, Dunk Island, Eungella Range, Mount Spec, and Atherton Tableland.

Family EUPHORBIACEÆ.

Mallotus angustifolius Benth. Attaining 60 feet high and 1 foot stem diameter. Stems sometimes angular in cross section. Bark grey with an inclination to be finely scaly. When the bark is cut it is light brown and measures $\frac{1}{4}$-$\frac{3}{8}$ inch thick on tree of above size. The sapwood, which is pale when first cut, turns to a sooty colour after being exposed to the air for about 10 minutes. The leaves are placed alternately on the branchlets or are occasionally clustered or approximated together at one region of the branchlet. Mount Spurgeon, Mount Bartle Frere, Johnstone River, Atherton Tableland, and Eungella Range.

Family ANACARDIACEÆ.

Blepharocarya involucrigera F. v. M. Northern bolly gum, rose butternut. Attaining 120 feet in height and 2 feet 6 inches stem diameter. Stem generally buttressed, the buttresses often prominent. Stem above buttresses often straight and fairly cylindrical. Bark grey, sometimes rough with small pustules and sometimes longitudinally wrinkled. When the bark is cut it is pinkish brown and measures $\frac{1}{2}$-$\frac{5}{8}$ inch thick on tree of above size. Sapwood white. The leaves are opposite each other on the branchlets and each leaf consists of several leaflets. Cairns region on the foothills of the mountains, Atherton Tableland, Endeavour River, and Coen River.

Family ICACINACEÆ.

Phlebocalymna lobospora F. v. M. Tree attaining 70 feet in height and 14 inches stem diameter. Bark grey, finely longitudinally wrinkled, the wrinkles not very long, and often with corky pustules in the wrinkles. When cut the bark is brown and $\frac{1}{2}$ inch thick on tree of the dimensions given above. Sapwood white. Bark and sapwood after being cut turn brown on exposure. The wood is pinkish or reddish in colour and the rays are fairly prominent but are not so large as those of many Proteaceæ. Atherton Tableland, Mount Spurgeon, and Eungella Range.

Villaresia Smythii F. v. M. So far as the writer has noticed this species does not much exceed 80 feet in height and 1 foot stem diameter. In the colour and appearance of the bark it is strikingly like *Villaresia Moorei*. See illustration on page 13 of "Australian Rain-forest Trees." The trees are sometimes crooked or irregular in shape. Their chief characteristics are the pale grey, longitudinally-fissured, corky bark and the pale, fairly soft wood with fairly prominent rays. The leaves are placed alternately to each other on the branchlets. Atherton Tableland and Mount Spec.

Family ELAEOCARPACEÆ.

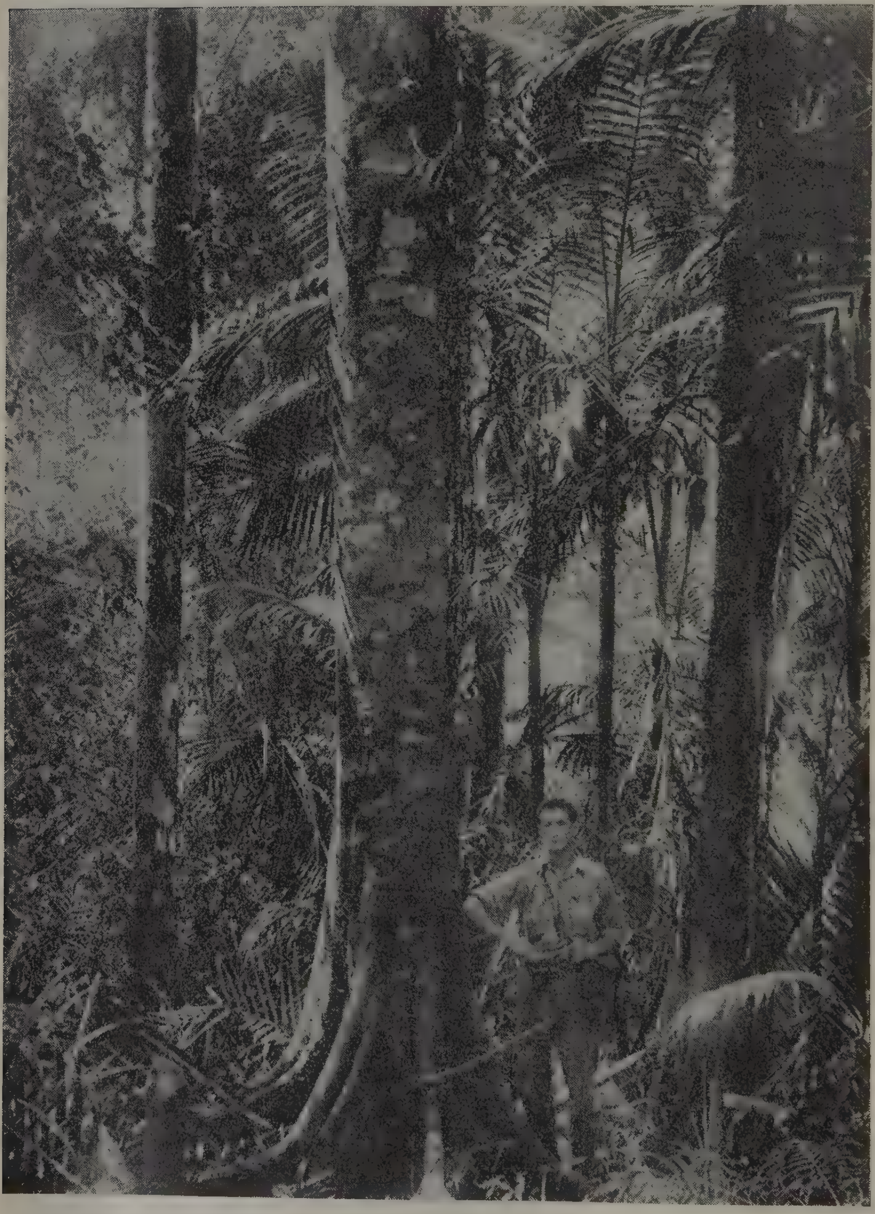
Sloanea Macbrydei F. v. M. Attaining 90 feet in height and 2 feet in stem diameter. Stem with very prominent buttresses. Above the buttresses the stem is often fairly symmetrical. Bark brown with longitudinal rows of pustules like those in the allied *Sloanea Woollsii*. When the bark is cut it is pinkish or reddish brown and measures $\frac{5}{8}$ inch thick on a tree of above size. Sapwood surface pale yellow. Wood cream-coloured or light brown. The leaves are placed alternately on the branchlets. The margins of the leaves are generally toothed. Ranges near Rockingham Bay, Atherton Tableland, and Mount Spec.

Sloanea Langii F. v. M. Attaining 90 feet high and 20 inches stem diameter. Stem with very prominent thin buttresses with their edges curving outwards. The stems are fairly straight and cylindrical above the buttresses. Bark greyish, slightly longitudinaly wrinkled. When the bark is cut it is very light brown and measures $\frac{1}{8}$-$\frac{1}{4}$ inch thick on tree of above size. Wood pale or nearly white. The leaves are placed alternately on the branchlets and the margins are often toothed. Shrubby forms of this species constitute a large proportion of the undergrowth of the rain-forest of Mount Spec. The species is also common in parts of the Atherton Tableland, such as at Gadgarra, where the above description was made.

Elæocarpus sericopetalus F. v. M. Attaining 90 feet in height and 20 inches in stem diameter. Stem somewhat buttressed. Bark dark brown with many closely packed pustules which are often arranged in longitudinal cracks. When the bark is cut the outer dead part is dark brown, the middle layer is pinkish brown, and the innermost layer is yellow. Sapwood yellowish. Heartwood light brown. The wood is fairly soft. The trees often have coppice shoots and the heartwood in the Mount Spec trees is sometimes decayed. The leaves are placed alternately to each other on the branchlets. The margins of the leaves are generally toothed. Like most of the other species of the *Elæocarpaceæ* the leaves often turn bright red or crimson in age. Byfield, Eungella Range, Mount Spec, and mountains about Rockingham Bay.

Elæocarpus ruminatus F. v. M. About 100 feet high and 2 feet stem diameter. Stem with buttresses. Stem often straight. Bark grey or brownish, slightly longitudinally wrinkled, with brown-coloured pustules in the wrinkles. When the bark is cut it is cream-coloured or light brown outwards and bright yellow inwards. Inner surface of bark and surface of sapwood bright yellow. The bark measures about $\frac{3}{8}$ inch in thickness on a tree of above size. Leaves placed alternately on the branchlets, leaf margins toothed. From Eungella Range to Rockingham Bay.

Elæocarpus foveolatus F. v. M. Attaining 90 feet in height and 2 feet 6 inches stem diameter. Stem mostly straight with buttresses at base. Bark light brown in colour, sprinkled with pustules which are often arranged in short longitudinal rows. When the bark is cut it is



[*Photo.: W. D. Francis.*

Plate 115.

Elæocarpus ruminatus, EUNGELLA RANGE.—Numerous Bangalow Palms (*Archontophœnix Cunninghamiana*) are shown in the picture.

pinkish brown outwards and yellow inwards. The bark measures ½ inch thick on a tree of above size. Inner surface of bark and surface of sapwood bright yellow. The leaves are arranged alternately on the branchlets and their margins are toothed. A peculiarity of the leaves is the hollow thickenings on the underside where the lateral nerves join the midrib. Looked at from the ground the foliage of the trees frequently has a brown appearance. Eungella Range to Daintree River. Very common on some of the higher parts of the Eungella Range such as the track leading to Mount Dalrymple.

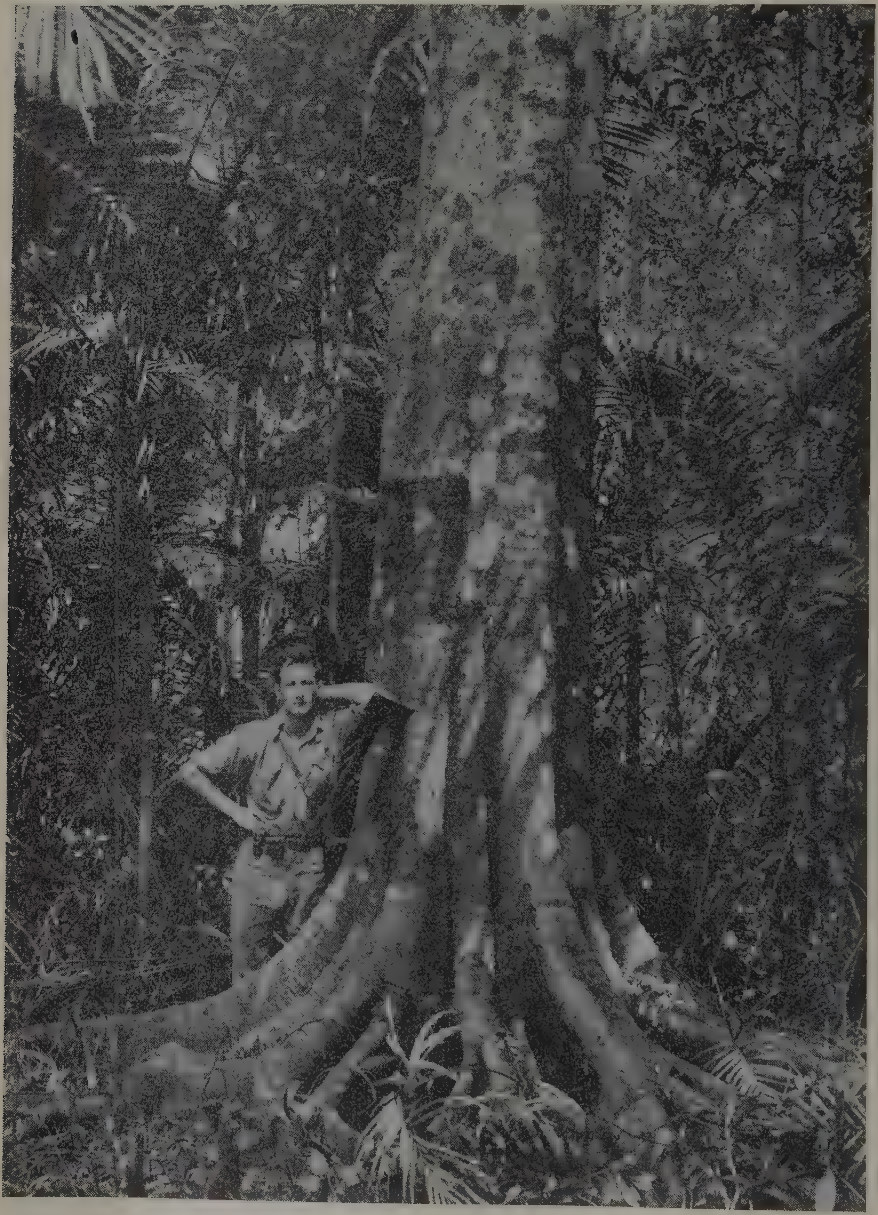
Elæocarpus largiflorens C. T. White. The Mount Spec trees attained 60 feet in height and 15 inches in stem diameter. Stem with small buttresses, otherwise fairly straight and slender. Bark brown with scattered pustules; the pustules often arranged in longitudinal lines or cracks. When the bark is cut it is dark pinkish brown on outside and bright yellow towards the sapwood. Sapwood surface whitish or greenish yellow. Sapwood nearly white. Heartwood light brown, sometimes decayed at centre. Leaves placed alternately on the branchlets. Margins of the leaves mostly toothed. At times the teeth on the leaf margins are small or inconspicuous. The sap oozing from the wood is said to be strongly irritating. Mount Spec, Atherton Tableland, and Johnstone River.

Elæocarpus sp. affinities *Elæocarpus obovatus* G. Don. The trees here described may not be specifically distinct from *Elæocarpus obovatus*. In fact at present the writer does not know how they can be separated from *Elæocarpus obovatus*. Attaining 100 feet in height and 2 feet 6 inches stem diameter. Stem buttressed at base just as shown in the illustration of *Elæocarpus obovatus* in "Australian Rain-forest Trees," p. 246. Bark grey or brown with a tendency to be longitudinally wrinkled. When the bark is cut it is pinkish brown and measures ⅝ inch thick on tree of above size. Sapwood surface greenish yellow. Mount Spec.

Family STERCULIACEÆ.

Sterculia laurifolia F. v. M. Sometimes called cabbage crowfoot. This common name is applied because the tree is remarkably like some of the Tarrietias in appearance, but the wood is much softer than the wood of the Tarrietias which are at times referred to as crowfoot elm. This is a buttressed tree with a grey or brown bark which has a tendency to longitudinal fissures. The leaves are simple and are not in threes or twos as in Tarrietia, and are placed alternately to each other on the branchlets. Atherton Tableland.

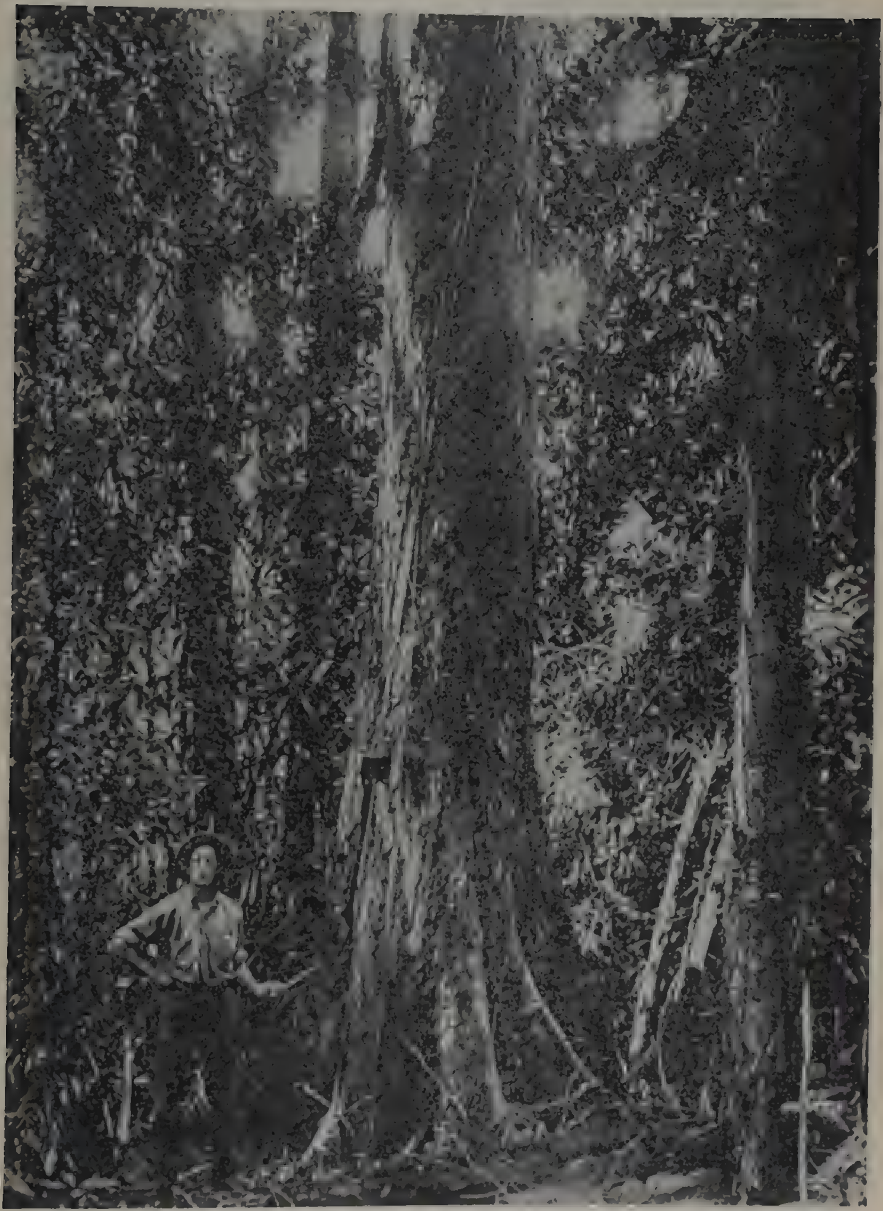
Tarrietia Argyrodendron Bentham. There are several varieties of this species in North Queensland. For brief descriptions of the varieties and pictures of the stem and herbarium specimens of the normal form the reader is referred to "Australian Rain-forest Trees," pp. 266-272. In general appearance the northern varieties, so far as is known, conform to the southern type as illustrated in the work quoted above. The trees are almost without exception buttressed. The bark varies from grey to brown, has a tendency to be longitudinally wrinkled or slightly fissured and at times in large trees there is a tendency to scaliness. The wood of all varieties always shows large conspicuous rays, although these as a rule are not so large as the rays of many *Proteaceæ* (silky oaks). The varieties of this species are extremely common in North Queensland lowland and mountain rain-forests.



[*Photo.: W. D. Francis*

Plate 116.

Elæocarpus foveolatus ON THE EUNGELLA RANGE.—This was a very common tree along the track from Eungella to Mount Dalrymple. The palms in the background are the Bangalow (*Archontophœnix Cunninghamiana*).



[Photo.: W. D. Francis.

Plate 117.

RED EUNGELLA GUM (*Eugenia hemilampra*), EUNGELLA RANGE.—The aerial roots of a fig tree are shown on the stem of the tree.

Family MYRTACEÆ.

Xanthostemon pubescens C. T. White. Red penda, Atherton penda. Attaining 120 feet in height and 4 feet 6 inches stem diameter. Stem tall and often straight, often very prominently buttressed. Bark grey or at times brown, somewhat scaly in large trees and sometimes with roundish depressions left by fallen scales. When cut the bark is brown or pinkish brown and measures about ⅜ inch thick on the sides of buttresses of tree of above size. Sapwood often very thin on large trees, flesh-coloured. Heartwood when fresh dark brown. Leaves mostly alternate but at times they are opposite each other on the branchlets. There is a drawing of the specimens by C. T. White in the Proceedings of the Royal Society of Queensland, Vol. 29, p. 58, 1917. Atherton Tableland.

Eugenia hemilampra F. v. M. Red Eungella gum. Attaining a height of 105 feet and a stem diameter of 3 feet 6 inches or even more. The stems are mostly straight and are somewhat buttressed at the base. Bark reddish brown, shed in flakes, inner bark somewhat fibrous. When the bark is cut it is reddish brown and measures ⅜ inch thick on a tree of above dimensions. The leaves are placed opposite to each other on the branchlets. It is very common on the Eungella Range and Mount Spec. This species and the allied or identical one known as White Eungella Gum are used for building purposes on the Eungella Range. The species ranges from the Clarence River in New South Wales to Cape York, Queensland.

Eugenia sp. White Eungella gum. It seems very doubtful whether this species can be kept separate from the foregoing species, *Eugenia hemilampra*. *Eugenia hemilampra* in its turn may not be specifically separable from *Eugenia Smithii*. The White Eungella gum is very common on the Eungella Range.

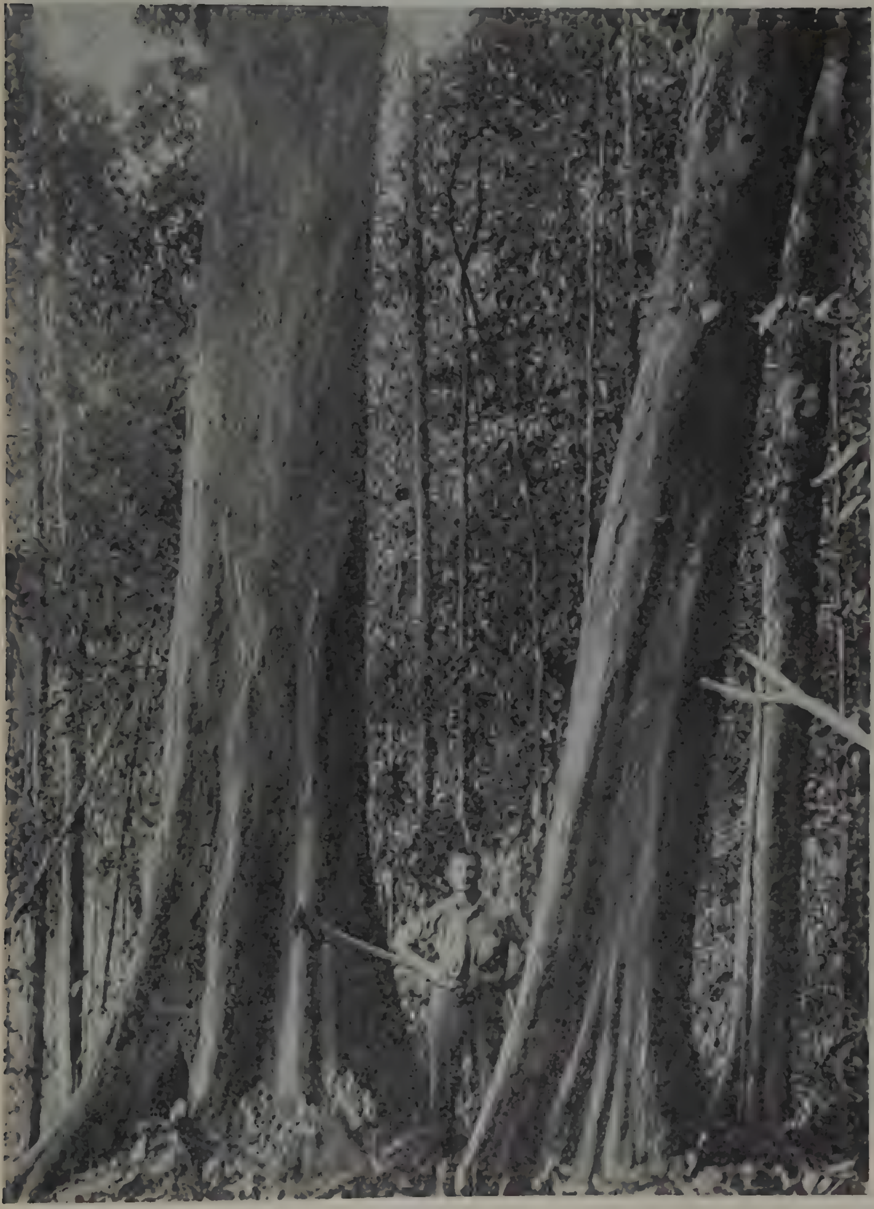
Family SAPOTACEÆ.

Lucuma galactoxyla F. v. M. Cairns pencil cedar, Daintree maple. A comparatively large tree. Stem with small buttresses at base. Bark brown with shallow longitudinal fissures spaced fairly widely (1-2 inch) apart. When cut the bark exudes a milky sap. Wood red, soft to cut. Daintree River, Freshwater Creek near Cairns, Johnstone River, and Rockingham Bay.

Sideroxylum euphlebium F. v. M. Attaining 60 feet in height and 14 inches stem diameter. Stem with buttresses. Bark dark brown with discernible or distinct longitudinal wrinkles or fissures. When the bark is cut it is yellow-brown and exudes a milky sap. The bark measures ⅜ inch thick on a tree of above size. The fruit is red when ripe and has a pleasant flavour. The fruit is globose or inclined to be egg-shaped, with a tendency to forming a point at the apex, 1-1½ inch long, ¾-1 inch across. Wood bright yellow-brown, hard, and apparently with long fibres. The leaves are placed alternately on the branchlets. Rockingham Bay (Dallachy), and Mount Spec.

Family SYMPLOCACEÆ.

Symplocos spicata Roxb. Attaining about 100 feet in height and 2 feet 6 inch stem diameter. Stem not prominently buttressed. Bark brown, finely scaly. When cut the bark is brown and measures 1¼ inch



[*Photo.: W. D. Francis.*

Plate 118.

WHITE EUNGELLA GUM (*Eugenia* sp.).—Two trees on the Eungella Range.

thick on a tree of above dimensions. The leaves are placed alternately on the stem and mostly have toothed margins. Eungella Range northwards.

Family APOCYNACEÆ.

Cerbera manghas Linn. Milky pine. Attaining 100 feet high and 2 feet 6 inches stem diameter. Stem not prominently buttressed. Bark grey, with large pustules measuring $\frac{3}{8}$-$\frac{3}{4}$ inch across, also with longitudinal cracks and a tendency to scaliness. When cut the bark is cream-coloured or yellow-brown, exudes much milky sap and measures $1\frac{1}{4}$ inch thick on a tree of above dimensions. The leaves are closely crowded towards the ends of the thick branchlets, which when broken exude large quantities of milky sap. The flowers are conspicuous, white or cream, and strongly fragrant. Atherton Tableland.

Family APOCYNACEÆ.

Alstonia scholaris R. Br. Milky pine, white cheesewood. Attaining 100 feet in height and 2 feet 6 inches stem diameter. The stems in large trees are commonly longitudinally grooved or furrowed, giving the stem the appearance of being deeply channelled. This furrowing or flanging of the stem imparts an angular or lobed contour to cross sections of the stem. Bark grey or light grey. In a closely examined tree the writer has described the bark as having horizontally elongated processes almost like transverse rings. When the bark is cut it is light or yellowish brown and exudes a large quantity of milky sap. The leaves are collected in groups or whorls of 4-7 at the ends of the branchlets and at intervals along the branchlets. A very common species in the rain-forests of the low lands from about 60 miles south of Mackay to Cape York. This species was not seen on the Eungella Range or Mount Spec, but there were some trees at Gadgarra on the Atherton Tableland.

Family VERBENACEÆ.

Gmelina fasciculiflora Benth. Attaining 100 feet in height and 18 inches stem diameter. Stem without prominent buttresses, often straight. Bark grey, somewhat scaly. When the bark is cut it is brownish yellow. The wood is white or pale cream-colour. The general aspect of the tree, the character of the bark and the appearance of the wood strongly resemble those of the Australian White Beech (*Gmelina Leichhardtii*), pictures and descriptions of which are given in Francis' "Australian Rain-forest Trees," 334-336. The leaves are large and placed opposite one another on the branchlets. The fruit are round with a blue rind. Atherton Tableland and Rockingham Bay.

LITERATURE.

BAILEY, F. M. (1890). Botany of the Bellender-Ker Expedition. Annual Report of Department of Agriculture, Queensland, for the year 1889-1890.

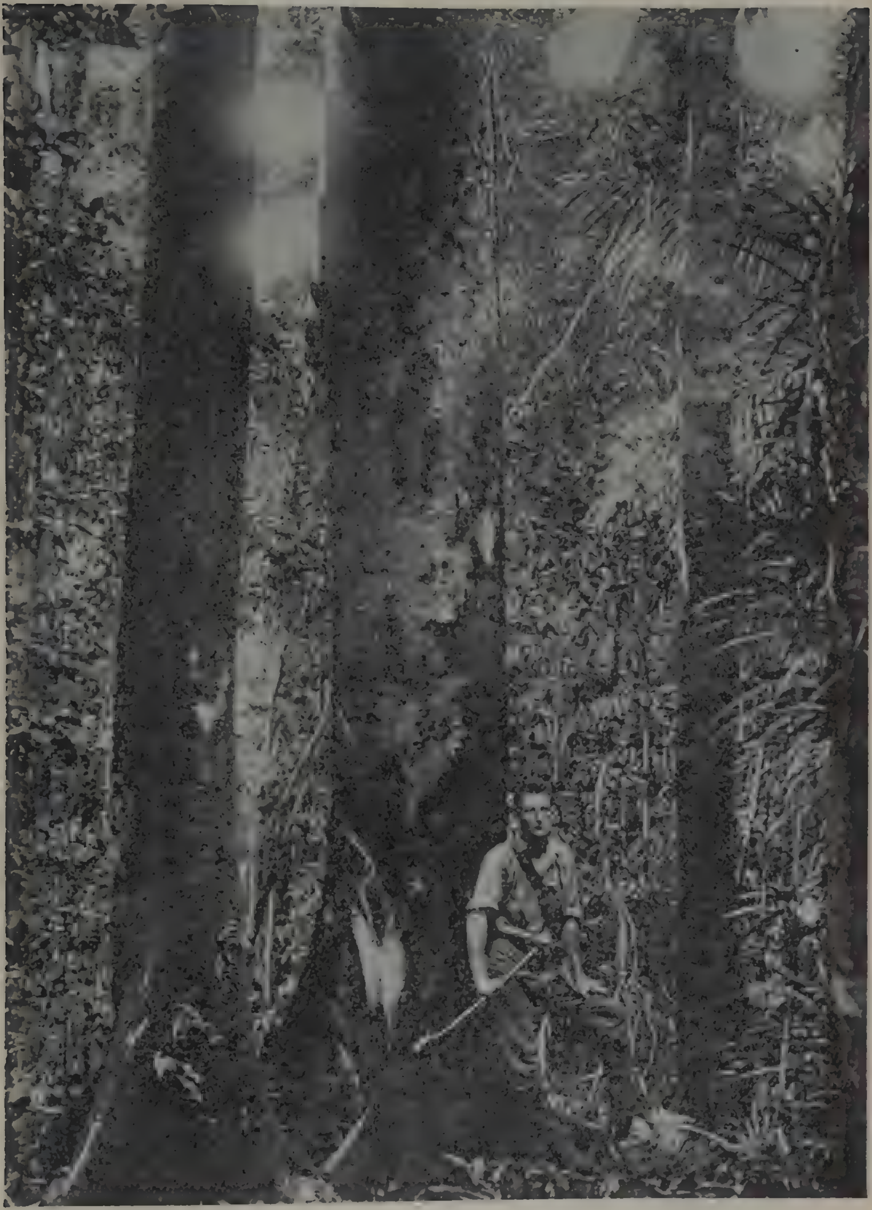
BAILEY, F. M. (1899-1902). The Queensland Flora, Parts I.-VI.

BAILEY, J. F. (1899). Report on the Timber Trees of the Herberton District. Queensland Agricultural Journal, vol. 5, p. 391.

BAILEY, J. F. and C. T. White (1916). Contributions to the Queensland Flora. Botany Bulletin 18. Department of Agriculture and Stock, Brisbane.

BAILEY, J. F. and C. T. White (1917). Contributions to the Queensland Flora. Botany Bulletin 19. Department of Agriculture and Stock, Brisbane.

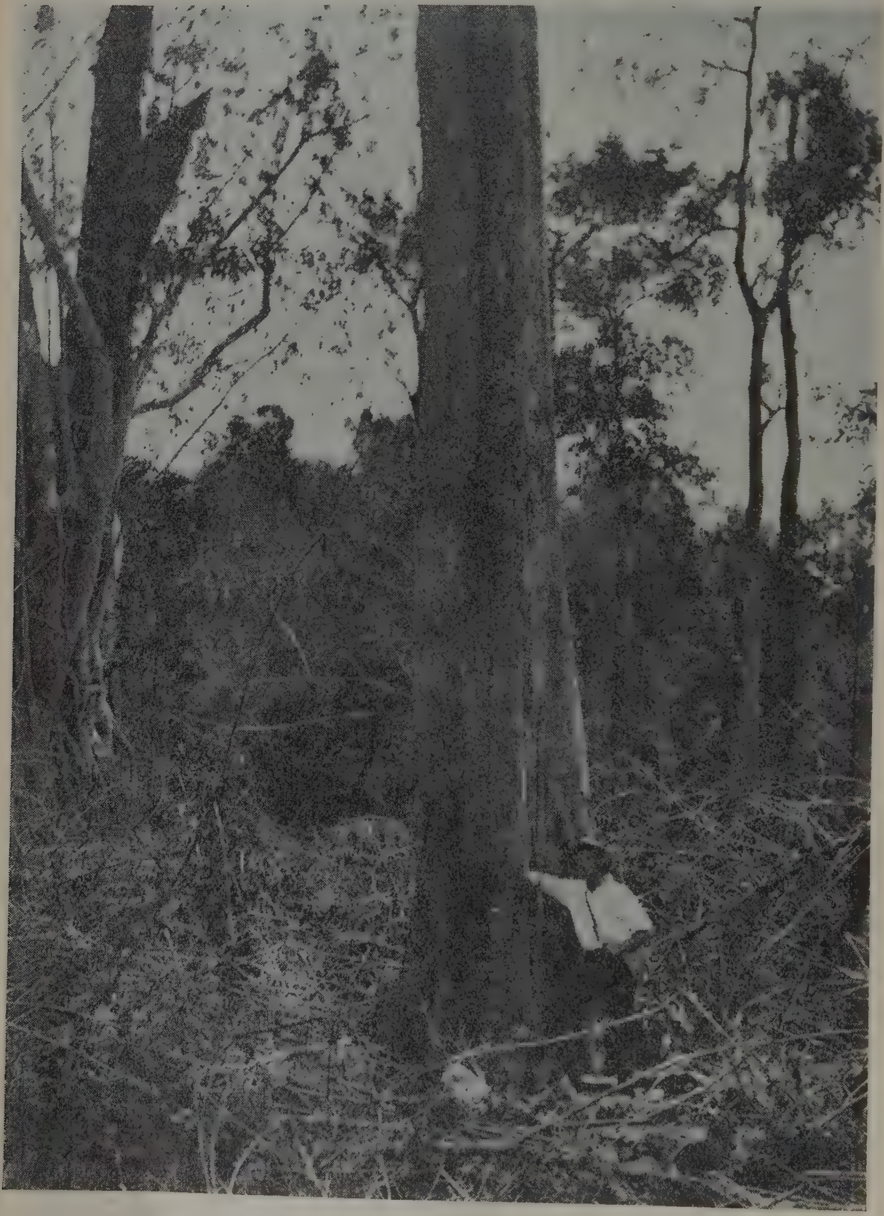
BENTHAM, G. (1863-1878). Flora Australiensis, Vols. I.-VII.



[Photo.: *W. D. Francis.*

Plate 119.

Symplocos spicata ON THE EUNGELLA RANGE.—The large tree on the left of the picture is a species of *Cryptocarya*. The small tree on the right is another specimen of *Symplocos spicata*.



[*Photo.: W. D. Francis.*

Plate 120.

SO-CALLED MILKY PINE (*Alstonia scholaris*).—A tree on flat land near Netherdale, at the foot of Eungella Range. This is a common tree in North Queensland rain forests. The rain forest around this tree had been felled, but not burnt.

DIELS, L. (1906). Die Pflanzenwelt von West-Australien. Mit einer Einleitung uber die Pflanzenwelt Gesamt-Australiens in Grundzugen. (W. Engelmann, Leipzig.)

DOMIN, K. 1921-1929). Beitrage zur Flora und Pflanzengeographie Australiens. Bibliotheca Botanica, Heft 89.

FRANCIS, W. D. (1923). Some Characteristics of Queensland Rain Forests and Rain-Forest Trees. Proc. Roy. Soc., Queensland, 34, 209.

FRANCIS, W. D. (1928). The Rain Forest of the Eungella Range. Proc. Roy Soc., Queensland, 39, p. 107.

FRANCIS, W. D. (1928). The Growth Rings in the Wood of Australian Rain-forest Conifers. Proc. Linn. Soc. N.S.W., 53, p. 71.

FRANCIS, W. D. (1929). Australian Rain-forest Trees excluding the Species confined to the Tropics. (Printed for the Commonwealth Government by the Government Printer, Brisbane.)

FRANCIS, W. D. (1931). The Buttresses of Rain-forest Trees. Kew Bulletin, p. 24.

FRANCIS, W. D. (1937). The Estimated Age of Some Queensland Trees. Queensland Agricultural Journal 47, p. 192.

GIBBS, Miss L. S. (1917). A Contribution to the Phyto-geography of Bellenden-Ker. Journal of Botany, 55, p. 297.

SWAIN, E. H. F. (1928). The Timbers and Forest Products of Queensland. (Government Printer, Brisbane.)

WHITE, C. T. (1917). Contributions to the Queensland Flora. Botany Bulletin 20. Department of Agriculture and Stock, Brisbane.

WHITE, C. T. (1919). Contributions to the Queensland Flora. Botany Bulletin 21. Department of Agriculture and Stock, Brisbane.

WHITE, C. T. (1921). Notes on the Genus Flindersia. Proc. Linn. Soc., New South Wales, 46, p. 324.

WHITE, C. T. (1933). Ligneous Plants Collected for the Arnold Arboretum in North Queensland by S. F. Kajewski in 1929. Contributions from the Arnold Arboretum IV.

WHITE, C. T. (1936). Contributions to the Queensland Flora, No. 5. Proc. Roy. Soc. Queensland, 47, p. 51.

WHITE, C. T. and W. D. Francis (1920). Contributions to the Queensland Flora. Botany Bulletin 22. Department of Agriculture and Stock, Brisbane.

WHITE, C. T. and W. D. Francis (1922). Contributions to the Queensland Flora. Proc. Roy. Soc., Queensland, 33, p. 152.

WHITE, C. T. and W. D. Francis (1924). Contributions to the Queensland Flora No. 2. Proc. Roy. Soc., Queensland, 35, p. 63.

WHITE, C. T. and W. D. Francis (1926). Contributions to the Queensland Flora, No. 3. Proc. Roy. Soc., Queensland, 37, p. 152.

WHITE, C. T. and W. D. Francis (1930). Contributions to the Queensland Flora, No. 4. Proc. Roy. Soc., Queensland, 41, p. 139.

◆

PRINCIPLES OF BOTANY FOR QUEENSLAND FARMERS.

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BRISBANE.

Packing Grapes for Market at Home and Abroad.

J. H. GREGORY, Instructor in Fruit Packing.

CAREFUL handling during harvesting is an essential preliminary to the satisfactory packing of grapes for either the home or export market.

Plate 121.

Showing the method of placing all stalks upward in the picking basket so that bunches can always be handled by the stalks without touching the fruit. This assists in preserving the natural bloom on the fruit.

HARVESTING.

Grapes should be picked in the cool of the day and never while still wet by rain or dew. Whilst being picked, the bunches should be trimmed of all small, damaged berries, care being taken all the time to keep the fruit as cool as possible. Large, roomy baskets make excellent picking containers, and when trimmed the bunches should be placed in these, stems upward. (Plate 121.) The bunches should always be handled by the stems in order to retain the natural bloom on the fruit. The baskets, when full, should be placed in a cool, shady position pending transport to the packing shed. At the shed the bunches should be examined a second time, and any damaged berries missed at the first inspection removed. They should then be spread out on a flat table (Plate 122), on the cool side of the building, again taking care to place them carefully with the stalks up. This will assist in keeping the fruit cool, and also enable the packer to quickly select any particular size or type of bunch which he may need to fill a particular portion of a layer when packing.

SWEATING OR WILTING.

It is advisable to sweat grapes for about twenty-four to forty-eight hours before packing. This is done by storing the fruit in a cool shed where the air has free circulation. Weather conditions have an effect on the sweating period, grapes in warm weather taking less time than in the cooler periods. After sweating, the skin of the fruit becomes tougher and more pliable, enabling it to be handled with greater ease and less risk of cracking the berries or damaging the fruit at the stalk. Sweating also helps to eliminate slackness in packing which is likely to develop during transit through shrinkage when bunches are packed without having been sweated.

Plate 122.

Fruit spread out on the table prior to packing. Again notice the way all stalks are placed upwards to permit easy handling of bunches.

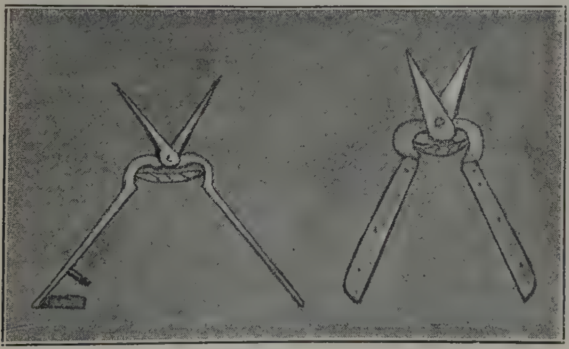

Plate 123.

Types of grape trimming clippers.

PACKING FOR LOCAL MARKET.

Containers.

There are two types of half-bushel cases in use and a quarter-bushel case. Bushel cases are not recommended. The dump half-bushel, 18 inches long by 7⅛ inches wide by 8⅔ inches deep, is a good container, but the half-bushel standard case, 18 inches long by 5¼ inches wide by 11¾ inches deep is better. This container when in transit has not the same weight of fruit pressing on the bottom layer as the half-bushel dump case, the "standard" only having 5¼ inches of fruit as against 7⅛ inches in the "dump." This is a factor for consideration where fruit is sent to distant markets. A quarter-bushel case is also used and is very popular on some markets. Growers are advised to consult with their distributors before using this package. Another popular method adopted by progressive growers is the use of cartons. (Plate 124.) Some growers use cardboard, but the best type of carton is one made of plywood. This has the advantage of not bulging at the sides when filled with fruit, as happens on occasions with cardboard, making it harder to place the containers in the boxes used for transit. The cartons can be made to a size that will hold approximately 2 or 4 lb. of fruit and will fit the ordinary cases in use. Different sizes of cartons can be used, but growers should be guided by their distributors as to the best sizes for their particular trade.

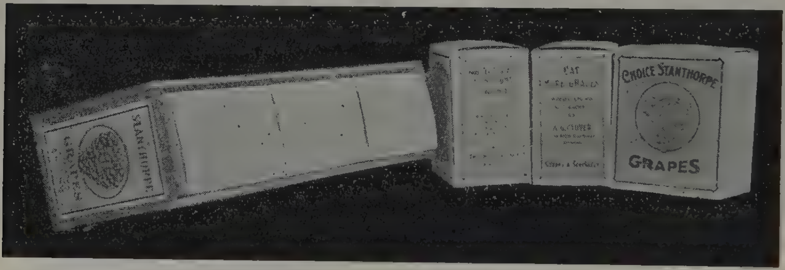

Plate 124.

Cartons used for packing. Three of these cartons fit ¼-bushel case.

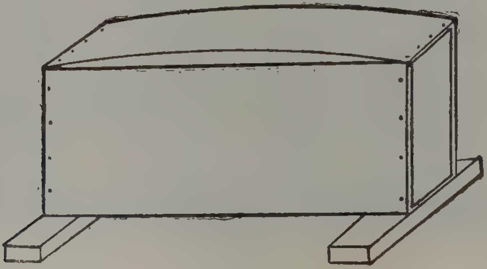

Plate 125.

Method of placing two pieces of timber on the floor of shed. This makes a good solid nailing down bench, and permits the bottom of the case as well as the top to bulge slightly when the lid is nailed on.

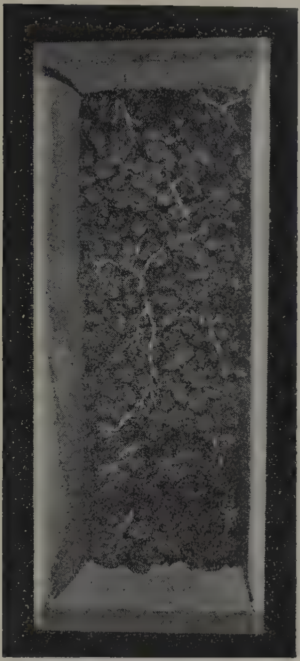

Plate 126.

Method of placing the first layer. Note how all stalks are placed inwards and upwards so that only fruit will show if the bottom board of the packed case is removed.

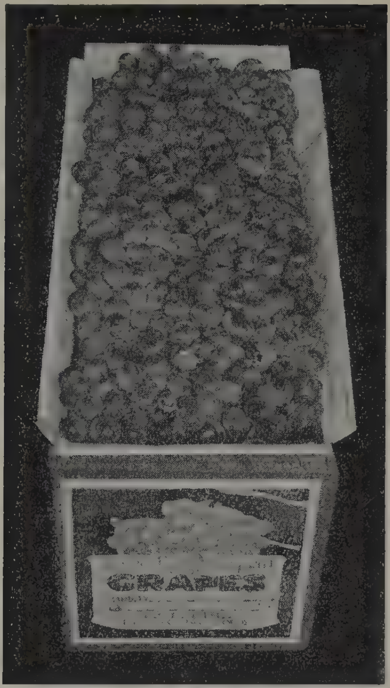

Plate 127.

Finished case before nailing down. Note how all stalks are carefully hidden. If care is taken, all sides of the case will open up showing fruit only.

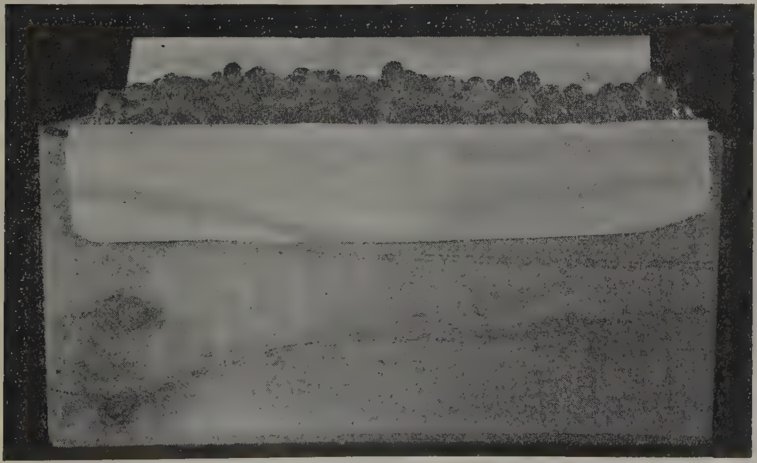

Plate 128.

Side view of case before being nailed down. Note the height of the fruit in the case.

Packing.

The same system of packing is adopted in all types of cases. Packers should endeavour as much as possible to keep all stalks to the centre of the box so that when opened the cases on either top, bottom, or sides show a surface of fruit with practically no stalks visible. (Plates 126, 127, and 128.) This style of packing is easily done. The case should be lined with clean white or coloured paper and the fruit carefully placed in the case in layers. The first layer is started by placing the points of two bunches in the corners of one end of the box with the stalks to the centre of the layer but facing upwards and inwards. (Plate 126.) Bunches are then placed point first into the corners made by these bunches and the side of the box until the layer is finished. The space, if any, between the two lines of grapes of the first layer is then filled by placing bunches into the space with the points to the bottom and the stalks up. This presents a level surface of fruit free from stalks to the bottom of the case. The process is carried on until with the dump case the case is half filled, when the fruit is shaken into position by light bumping. Battens should be placed beneath the ends of the case while this is being done. The standard case should have the fruit eased into position when about one-third full and again when about three-quarters full. The case is finished by packing the fruit in layer by layer, bringing the fruit to a height of 1 to 1½ inches (Plate 128) above the top of the case. Battens are then placed under the ends of the case, the paper folded over, the lid held in position with a gentle pressure placed on the fruit and the case. If sufficient care is taken, the bunches will not be injured in any way. After easing the fruit into position, and before finally nailing down, the lid should be removed and the top of the case inspected. If by mischance any grapes are cracked these should be carefully clipped and removed. The whole success of grape packing is having the fruit tight in the case to prevent movement whilst in transit. Movement in the finished case causes damaged and wet fruit, making consignments wasty and unsaleable.

PACKING FOR EXPORT.

Where grapes are intended to be stored either for lengthy periods or transported over long distances in refrigeration, two materials are used for packing—granulated cork or sawdust and sulphite paper and woodwool. The most favoured method commercially is the use of granulated cork or sawdust as the packing medium. This method of packing has the advantage over the sulphite tissue paper and woodwool, in the fact that a much larger quantity of fruit can be packed in the case. This is an advantage from the buyer's point of view. It also means that the grower does not need such a large number of cases to harvest his crop, thereby greatly reducing his outlay for timber, handling, and cartage. Shipping freights, which are based on the cubic space occupied, also are reduced, as a greater quantity of fruit is contained in a given space. Moreover it should be remembered that overseas buyers buy the fruit on the basis of the weight contained in the case. The sawdust or cork should be absolutely clean and free from taint.

Every variety of grapes grown in Queensland is not suited for export. The best varieties in their order of merit are:—White grapes—Waltham Cross, and Cervant; black grapes—Purple Cornichon, Black Malaga, and Black Muscat; red grapes—Red Malaga and Flame Tokay.

This preference is based on the results of export consignments to the East, New Zealand, and Canada, and experimental packages stored in Brisbane.

After analysing the results of experimental consignments, the periods for which the several varieties may be stored with safety are:—Black Muscats, four to five weeks; Waltham Cross, five to six weeks; Purple Cornichon, Flame Tokay, Red Malaga, Black Malaga, and Cervant, seven to eight weeks.

It must be stressed that safe storage can only be achieved by every attention to careful handling.

Selection of Fruit.

Careful selection of bunches also is an important factor in successful exporting. Large, loose types of bunches should always be selected. Tight bunches are unsatisfactory, as they are harder to clean and trim without damage to the berries. Often the large, tight bunches contain many blemished berries in the centre of the bunch which can only be satisfactorily removed by cutting the bunches into sections. This is undesirable, as the value of the fruit is depreciated by reducing the size of the bunches. Bunches should be selected containing only large, even fruit. Bunches of small fruit are of low commercial value. It is advisable to leave a length of the stalk attached to the bunch when picking. This assists the packer when handling the fruit. Bunches with long stalks appear to carry and open in better condition than those with stalks clipped short.

Containers.

The container used, when packing with cork or sawdust, is the three-quarter bushel with a centre partition. The dimensions of this case clear of the partition when made on the flat are: 24$\frac{5}{16}$ inches long by 12½ inches wide by 6½ inches deep. Packing should be done from the side with the case made on the flat. This case is also quite satisfactory for the sulphite paper and woodwool packing. A smaller case is not recommended commercially, although satisfactory results can be obtained with the standard half-bushel case, 18 inches long by 11½ inches wide by 5¼ inches deep.

Lining Paper.

Lining paper is used with all packs. To save time, plain white or coloured paper cut to the correct size to fit the case should be used. For the ¾-bushel, paper 12 inches by 20 inches wide is suitable and leaves a good margin for overlapping. The paper should be placed in the case neatly, as damaged or torn lining paper creates a bad first impression when fruit is being examined.

Granulated Cork Filler.

Cork is packed in bales ready for use, but pressed into a tight mass. This can easily be broken up by the use of an old chisel with a stabbing motion. The bulk cork should be placed in a bin, for if left open the wind will soon blow it about the packing shed, causing waste, extra work and loss of time in clearing up.

A kerosene tin cut on the flat is a good cork measure, permitting the packer to see the amount of granulated cork he is using. The average case of fruit takes approximately 1⅓ kerosene tins of cork for packing. This will vary slightly whether the cork is fine or coarse, or the bunches tight or loose.

No weight of cork can be given for use to a case, as the different types of cork vary in weight, some being 4½ lb. and others as low as 2½ lb. to the kerosene tin.

The cork should not be too coarse. Care should be taken to see that it is not too finely granulated, as cork of this description adheres firmly to the fruit after storage, spoiling the selling value. It should be remembered that after being conveyed long distances and being stored a long time, bunches cannot be shaken too roughly to dislodge cork, as the berries are not as tight on the stalk then as when picked, hence the necessity of the cork being free from dust and not ground too finely.

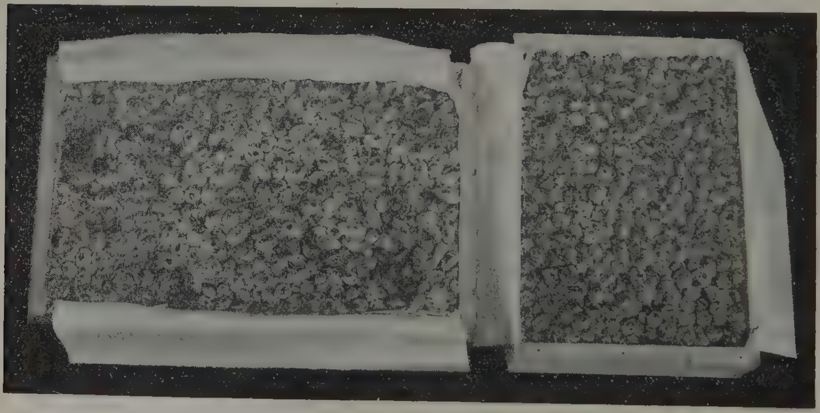

Plate 129.

Standard ½-bushel and ¼-bushel case opened on the side showing the absence of stalks when the fruit is packed correctly.

Packing With Cork or Sawdust.

When packing the case on the flat, it is first lined with paper and a layer of cork or sawdust about ¼ inch in depth spread on the bottom. The trimmed bunches are then placed in a layer upon this, and when the layer is completed more cork or sawdust is poured in until the layer is just covered. This process is repeated until the case is filled (Plate 130) to ½ inch above the top. The contents of the case are then shaken into position by placing the lid over the fruit and gently knocking each end upon the bench. If this is carefully done no damage to the berries will result. If any berries happen to become damaged they should be carefully clipped off and removed. A layer of cork is then spread on the fruit (Plate 131) and the lid applied.

Packing in woodwool and sulphite paper will present little difficulty. The case is first lined with paper, and then a pad of woodwool is placed on the bottom and around the sides of the box. The clipped bunches are then carefully wrapped in the sulphite paper and placed closely together in the box. Only large-sized bunches should be used. Where bunches are small, two at a time can be placed in the one sheet of paper. This is preferable to wrapping small bunches separately. The packer should aim at having one layer of fruit in the case. From this it will be seen that only large bunches will adapt themselves satisfactorily to this pack. When the box is filled any spaces between the bunches are carefully padded with woodwool (Plate 132). A layer of woodwool is finally placed on the top of the fruit, and the lid placed in position. The sulphite paper should be cut at least 15 inches by 15 inches in size.

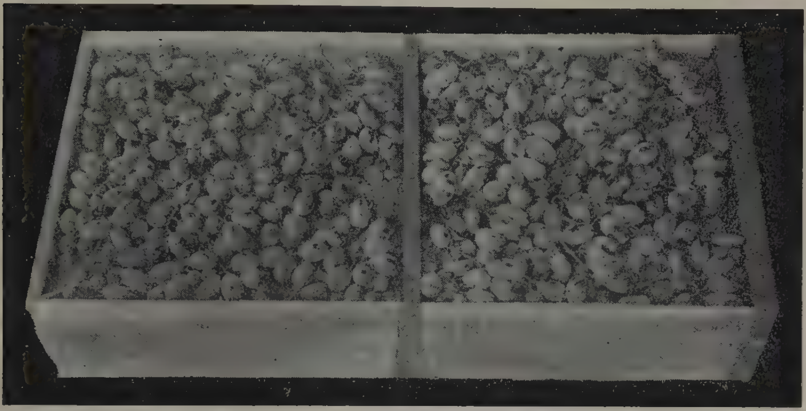

Plate 130.

CASE PACKED FOR EXPORT.—Before nailing down the fruit is covered with a final layer of cork or sawdust.

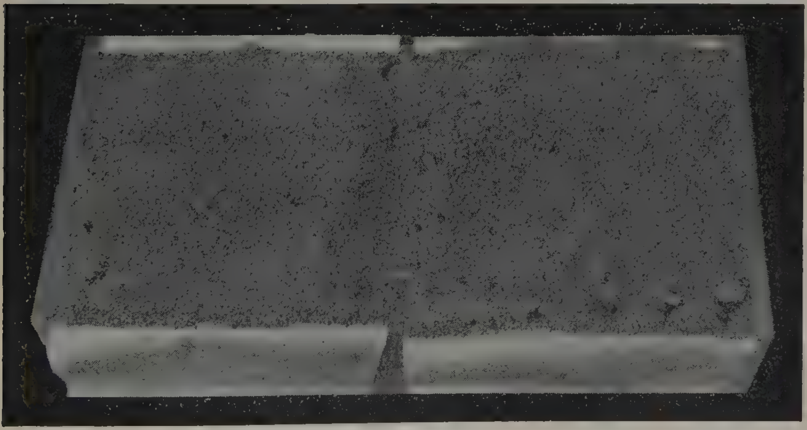

Plate 131.

The same case as in Plate 130 with a final layer of cork applied. This case is now ready to nail down.

Special points to remember are—

Tease the woodwool into a soft pad.

Keep the bunches tightly packed and well padded so that there is no movement in the fruit after the lid is applied.

Close attention to the following general points when packing grapes will assist greatly in obtaining satisfactory results:—

1. Clip—not pull—all blemished, diseased, and small berries from every bunch. Remember the export trade only wants very high-class fruit. Pulling causes waste.
2. Do not pick grapes after heavy dew or rain, but wait until the fruit has dried. Moisture is fatal to the successful carriage of grapes.
3. Avoid cutting up bunches as much as possible; small bunches or sprigs of berries spoil the sale of high-class grapes.
4. Sweat bunches in a cool, dry place.
5. Do not pack fruit while warm, but allow all fruit to cool completely before being packed.
6. Handle fruit by the stalks only. This helps to preserve the bloom on the grapes, assists them to keep a fresh appearance even after a long period of storage.
7. See that all boards fit closely together when making up cases.

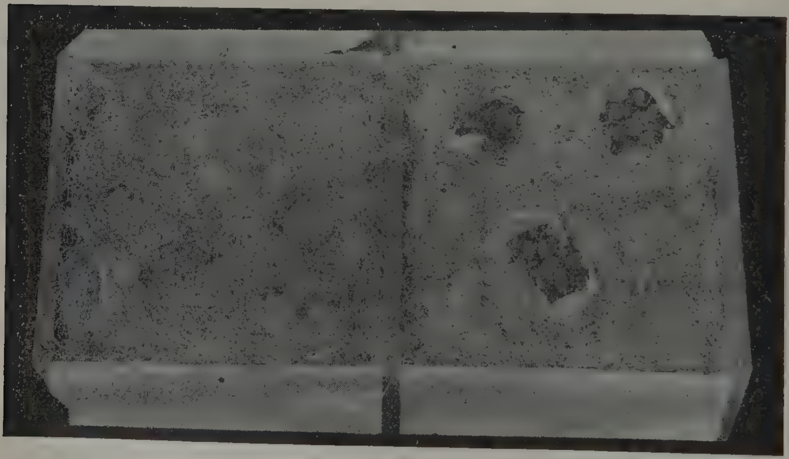

Plate 132.

Fruit packed for export using the sulphite paper and woodwool method of packing. The paper on three of the wrapped bunches is torn, showing the fruit.

SHED EQUIPMENT.

The equipment necessary in the packing shed is not very costly. One set of small platform scales, long benches for laying out the grapes ready to pack, packing stands to hold the case whilst being packed, grape trimmers, case-making bench, wiring machine, 1 large bin for holding bulk cork, and kerosene tins cut flat for cork measuring. The benches and stands can be made cheaply at home. Empty galvanised iron crates with the addition of legs make satisfactory benches.

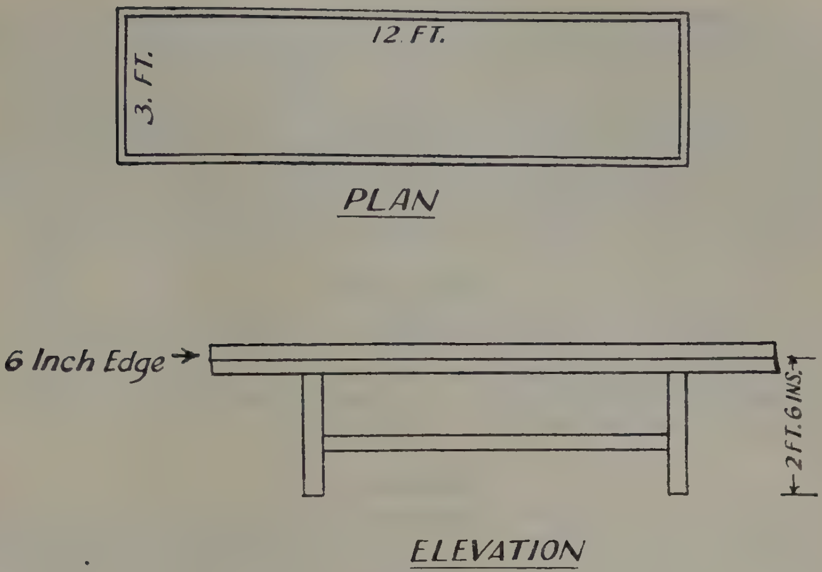
12. FT.
3. FT.
PLAN
6 Inch Edge
2 FT. 6 INS.
ELEVATION

Plate 133.
Table to hold fruit whilst packing.

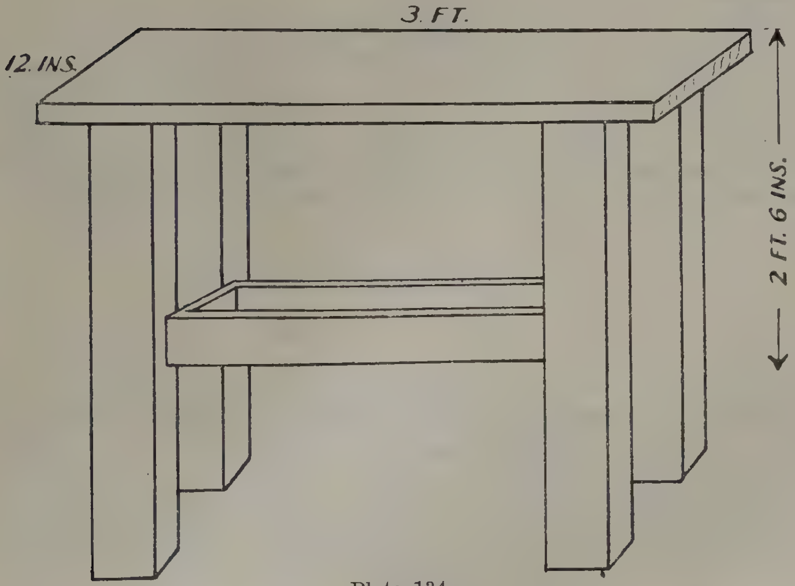
3. FT.
12. INS.
2 FT. 6 INS.

Plate 134.

Packing Stand.—This stand will hold one export case and the kerosene tin cork container whilst packing.

LABELLING.

The use of a distinctive label is of great assistance from the display and advertising point of view. Labels should be bright and attractive. The design should have spaces left for printing all particulars, such as the weight and variety of grapes. To be complete the label should have embodied in the design the grower's name and address, and the words "Queensland, Australia" in plain letters in order to conform to the Commerce Export Regulations. A label 11 inches by 5½ inches will fit the end of the export case or standard half-bushel. The dump half-bushel label will measure a maximum size of 8 inches by 7 inches.

STENCILS.

Stencils, if used, must also conform to the Commonwealth regulations and Queensland Fruit and Vegetables Act by having the full name and address of packer, and where used for export the words "Queensland," "Australia." Cases must also be branded with the name of the fruit and the weight contained in the case.

WIRING.

Wiring the cases when exporting or sending long distances is a necessity. The wires should be placed around the case ⅛ inch from the inside edge of the ends. Two wires should be used, one at each end in preference to one around the middle of the box. Care should be taken to see that they are placed around the case parallel with the end. This is essential if the wiring is to give the best results. Often when packing for local markets two small boxes can be wired together to advantage.

TRANSPORT.

It is necessary to follow up good harvesting and packing operations by careful handling whilst the fruit is in transit to rail or wharf. The fruit should not be left where it can become wet. Carters should not walk on or sit upon packed cases. It is only by close attention to all these details that the perfect product can be delivered at its destination in a condition that will ensure satisfactory values.

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Strawberry Culture in Queensland.

H. BARNES, Director of Fruit Culture.

THE commercial production of most berry fruits is commonly considered to be better suited to temperate climates than to the semi-tropical conditions of Queensland. The strawberry, however, is an exception which, because of concentration largely on locally raised hybrids, can be and is grown to perfection in this State. It has, moreover, attained a position of considerable economic importance in the fruit industry. It yields a quick return, and has thus been the means of tiding many orchardists over the difficult period during which slower maturing crops are coming into bearing.

The main centre of production is the coastal district, extending about 300 miles northwards from the New South Wales border, and there the strawberry has proved itself to be a hardy plant, yielding prolific and early crops of excellent quality.

Production on a small scale has extended over the remaining portion of the coastline as far north as Townsville, where, although within the tropics, quite good results are obtained under favourable conditions of alluvial soils and irrigation. Some berries are also grown on the tablelands adjacent to the coastline, where rainfall is sufficient or irrigation is practicable, but, as previously stated, the big production comes from the southern coastal area within easy access of the metropolitan market and the canneries.

There is a good demand for the fresh fruit, both locally and for the early shipments sent in cool storage to Southern capitals, while factories are using greater quantities each year for canning and jam making.

SOILS AND THEIR PREPARATION.

The best soil for the strawberry is a rich light to medium loam of either scrub or forest origin. Heavier soils may be used, but are not considered to be as suitable. In any event, whatever soils are used, they should be well supplied with humus and possess good, natural, drainage. Heavy clays and soils which are cold and poorly drained are not suitable, and their planting will only result in endless trouble for the grower.

Preparation of the soil must be thorough. Virgin lands are, as a rule, fairly rich in humus, and, after clearing, should be ploughed shallowly, cross ploughed, and then finally ploughed deeply and well harrowed several times to break them down to a fine tilth. On such soils, unless they are very poor, it is often unnecessary to apply fertilizers for the first crop, as there is usually plenty of available plant-food present in the soil. For subsequent crops, however, fertilizing is important. On old land or land deficient in humus, systematic fertilizing with animal manure at the rate of 40 loads to the acre, or, if that is unavailable, the ploughing in of green manure crops is necessary.

Humus has a very important influence on soil fertility. Its presence also enables the soil to retain a much greater percentage of moisture. This is of the utmost importance in soils devoted to strawberry growing, as the plant is shallow-rooted, and soon wilts when there is any shortage of moisture.

Plate 135.

A Strawberry Garden on the Near North Coast.

When leguminous plants—such as cowpea, Poona pea, vetch bean, and Mauritius bean—are grown as summer green manure crops, or field peas, vetches or tares are grown as a winter crop, it is advisable to assist their growth by broadcasting a light dressing of fertilizer made up of 2 cwt. of superphosphate and 1 cwt. of muriate of potash per acre. No nitrogen need be applied, as the plants will obtain their requirements from the air. When the green crops are ploughed in, the soil will not only be enriched by the plant foods contained in the fertilizer applied to the soil to produce the crop, but also by the nitrogen that has been absorbed by the crop from the air.

FERTILIZING.

The fertilizing of strawberry plants should consist of an application of one of the commercial strawberry fertilizers sold by recognised firms, at the rate of about 10 cwt. to 12 cwt. per acre, or the following complete mixture, which is recommended by the Agricultural Chemist, per acre:—

2¼ cwt. sulphate of ammonia;
6 cwt. superphosphate; and
3 cwt. sulphate of potash.

This should be applied as follows:—7¼ cwt. before planting, and four top dressings of 1 cwt. each at fortnightly intervals from the time the fruit is first forming. The first application should be distributed along the rows, and worked in a week to ten days before setting out the plants if a new planting is to be made; or if used on old plants the fertilizer should be spread along both sides of the rows some time in March, and worked in. The top-dressings should be worked in lightly with a hoe.

SELECTION OF PLANTS.

Only strong runners from healthy, prolific plants should be used. The first rootings of the runners nearest to the parents are to be preferred, as they are invariably the strongest and best-rooted plants. They grow vigorously and come into bearing early. If not enough first rootings are available, the second rootings of the runners are the next best plants, and so on. They may not fruit as early as the first runners, but, nevertheless, they will produce good crops, and frequently continue to bear when the earlier fruiting plants have ceased bearing.

PLANTING.

March and April are the main planting months. After having secured suitable plants, the roots should be trimmed with a sharp knife to about 3 to 4 inches long, care should be taken not to let them dry out. It is not sufficient for good results merely to push the plants into the ground and fill in some soil. Planting should always be done carefully. The roots should be spread out evenly, leaving the heart, or crown of the plant, as it is better known, just above the level of the ground. Fine soil should be placed round the roots and pressed down. In Plate 136, Fig. 1 shows a plant set too deeply; in Fig. 2 the roots are all bunched together, so the plant has not got a firm hold of the ground. Fig. 3 illustrates a plant with the crown too far above the ground, while in Fig. 4 the plant is shown planted at the correct depth and the manner of spreading the roots.

Planting is usually done by hand, or with a trowel. A planting-wire stretched across the field will act as a guide in keeping the rows straight.

Careless planting is responsible for the failure of many plants, especially planting too deep, as no strawberry will thrive if the crown is buried under the soil.

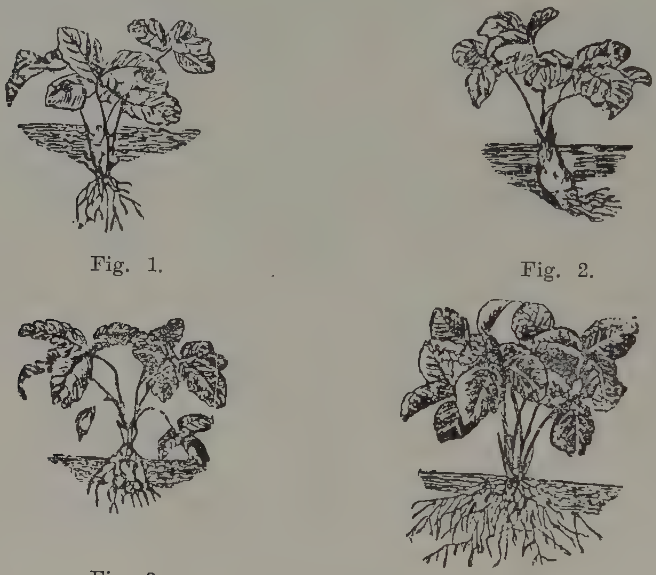


Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Plate 136.

The distance at which to set out the plants varies in different districts, but in any case it is not advisable to over-crowd them. In single-row planting, the plants are often set 12 to 15 inches apart in rows 24 to 27 inches apart. This system has a disadvantage in that there is a tendency when cultivating and harvesting to walk up and down each row, and so tramp the soil hard. Double-row planting is most favoured. By this method the plants are set out 12 to 15 inches apart in double rows, which are 20 to 24 inches apart, while between each double row a distance of about 30 inches is allowed. The greater width between each double row becomes eventually and automatically a pathway from which all weeding, harvesting, and fertilizing can be done without tramping the ground all round the plants.

CULTIVATION.

Strawberry plants must be only surface worked while growing or bearing fruit. The object is to keep down weed growth and to prevent the surface of the soil from caking; but the cultivation must never be so deep as to injure the roots. A useful implement is the Planet Junior hand cultivator or similar machine; or, failing that, a good Dutch hoe.

If the plants are to be kept for a second or third year's cropping, the whole of the runners, other than those required to make good any losses of the original plants, should be removed as they appear. Early in the following March the ground between the plants should be well broken up and fertilized again, so that the plants will be ready to produce another good crop in the next season.

MULCHING.

Mulching is not practised to any extent in Queensland, other than the soil mulch produced by surface working. A few growers use dried grass or straw, and this is considered good practice, since it keeps the berries cleaner, and also aids in conserving moisture.

The use of paper mulch has a lot to recommend it, since it also prevents weed growth, but the outlay of about £16 per acre has to be taken into consideration.

IRRIGATION.

Where water is obtainable, it should always be made available for the plants' use during dry weather, as the ability to maintain an adequate supply of moisture in the soil at all times, and thus maintain an even growth, will result in larger and better fruit and a heavy increase in yield. Strawberries pay well for intensive culture, and the money spent in providing a good system of overhead or other method of spray irrigation will be a very profitable investment. A combination of mulching and spray irrigation will enable a grower to maintain a regular supply of first-class table fruit throughout the season.

VARIETIES.

Although most of the standard varieties of strawberries have been grown in Queensland at one time or another, experience has shown that no one variety has proved permanent, and that it is necessary to raise new kinds from seed. Varieties producing perfect flowers have proved more profitable than pistillate sorts, and are, therefore, more common.

After being grown for a few years under Queensland conditions most varieties become weaker in growth, more liable to disease, and less prolific, so that they have to be rejected. The production of new sorts is thus essential, and there is no better way of doing this than by raising local seedlings. Some of the best varieties ever grown in the State have been locally-raised seedlings, of which the Aurie, Anetta, and Phenomenal are good examples. There is no reason why others, equal or even superior to these, should not be produced. Of the well-known standard varieties—such as Marguerite, Trollops, Victoria, British Queen, Pink's Prolific, Federation, Melba, and Edith, and several others which have been grown from time to time—few are now planted. Phenomenal (a Gympie-raised seedling) and Aurie (another variety of local origin) are now the most common varieties. Other new varieties are being tested, and some of them may prove adaptable to local conditions. The type of strawberry best suited to Queensland conditions is a vigorous healthy grower—that is, a heavy bearer of highly-coloured fruit of firm texture and fine flavour; a fruit which keeps and carries well, and which meets the requirements of both the fresh fruit trade and of the jam maker.

As strawberry seed is produced freely and germinates readily, raising seedling plants, which usually fruit the following season, is recommended. By careful selection, there is reasonable possibility of improving on existing varieties. Seed should not be collected indiscriminately, but from fruit produced freely on plants showing marked vigour.

DISEASES.

A pamphlet, dealing with the control of diseases, is obtainable from the Under Secretary, Department of Agriculture and Stock, Brisbane, B. 7.

Australian Native Vegetables.

E. HIRSCHFELD, M.D.

BEFORE the white man came to Australia, the aboriginals lived on what their soil could bring forth—game, animals of every description, and insects supplied them with flesh-food. The seeds of grasses, plants, and trees furnished grain. A wide range of herbage served them with vegetables, particularly during the winter months. There was no need to cultivate the soil, as the produce could be gathered with little effort. Physically, we know, they were a fine race; so their food supply must have been ample for their needs.

The white man pushed his way from the coast into the back country and built up his home in this new land, where everything was strange to him. He was forced to learn his bush-craft from the natives, who were experts at gaining their living from the soil. Vegetables must have been even scarcer then in the bush than they are now in the West. We can readily imagine white women making salads from "pigweed" or boiling it for cabbage, cooking what later on became known as New Zealand spinach. Probably the aboriginal servant taught her mistress how to prepare this native herbage. We must remember that in those days the dread of scurvy was uppermost in the minds of all who had to travel a long way by sea. Scurvy and its symptoms were then as well known as influenza is nowadays.

Gradually communications with the coast were being improved; seeds of European vegetables came out to the settler from the home country, and the English vegetables which they had done so long without were once more appreciated by palates which had been accustomed to them all their lives. Thus the native article fell into disuse, except in the further West, where the shortage of rain made the cultivation of English vegetables a matter of difficulty. Mrs. Duncan-Kemp in her book, "Our Sandhill Country," gives a most interesting and varied account of the native vegetables she learnt to prepare from the blacks on Mooraberrie station on the Diamantina. But except for isolated accounts here and there, most of which are difficult to get at, the bulk of the knowledge and lore that the aboriginals had once possessed and passed on to the pioneers is practically lost. Yet it is an admitted fact, that the lack of fresh vegetables in the West causes ill-health amongst the settlers and may stunt the growth of children. The tragedy of it all is that, in many cases, fresh vegetables are within the reach of the settlers, if they but knew it. The herbage growing at their very doors contains vegetables, perhaps not as tasty as the ones they have been used to but otherwise wholesome.

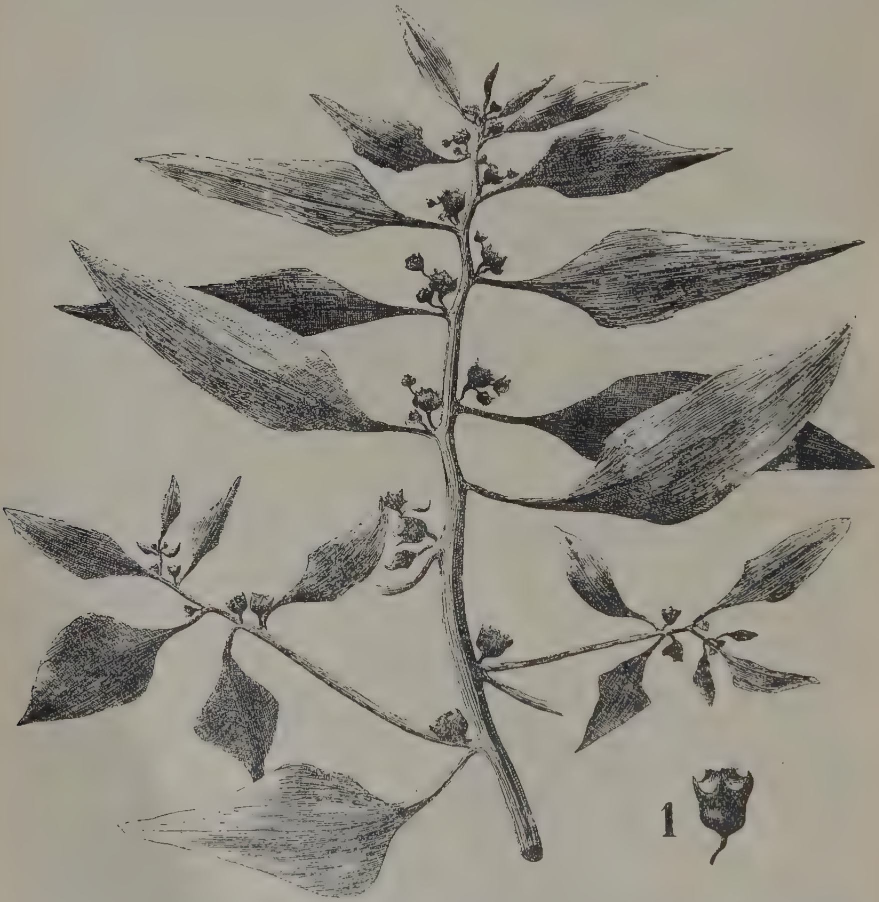
Like most settlers in the West we had been aware that some of the herbage favoured by the stock was also good for man to eat. But when one sees the same thing day by day one is apt to take things for granted without further inquiry. The following incident focussed our attention on to the matter. My son, R. S. Hirschfeld, and I were camped on the banks of Comorrin Creek, which runs through our holding—Bybera—in the Goondiwindi district. He was telling me of a droving trip from near the South Australian border to Bollon, having been one of the outfit that was taking 1,800 cattle on this fairly long trek. One day it had fallen to his lot to watch a gate and count the bullocks as they were passing through. Near the gate was a lot of herbage growing which looked like spinach, and was probably creeping saltbush. Having been on damper, corned beef, and black tea for many weeks, he tasted it, and finding it good to eat fairly gorged himself with it. The feed seemed to make a different man of him; not only did he feel in better health, but the sores on his hands started to heal up. Interrupting his yarn, he pointed to some black-polled cattle which had come to graze not far away. "You see those steers over there; they are after a plant which is growing on this sandy soil. Some stock can always be found over that part of the run. I wish I knew what it was! Come along and I'll show you, then you can take it down to Brisbane and submit it to Mr. White. He'll know." It was a creeping plant with fleshy, juicy stem and leaves and a sky-blue flower. The Government Botanist, as usual, was a mine of information. He identified it as *Commelina cyanea,* usually known as "scurvy grass." It is moderately common all over the western country, generally preferring sandy soil. Its fleshy stalks and juicy leaves were eagerly sought after by sheep and cattle. Its usefulness did not end there. It could be used as a vegetable for man. When boiled it resembled cabbage, but was often eaten raw. It had acquired a reputation for protecting people against scurvy and curing them of it. Hence its name.

Evidently the Aberdeen-Angus steers knew more about plant physiology than we did. The whole incident, together with the finding of this "scurvy grass" with its suggestive name, made a deep impression on me; I was determined to find out more about it. Years previously the Government Botanist had made a thorough survey of all the grasses on our holding. The survey had been subsequently referred to the Kew Gardens authorities in England, re-identified by them, and has been the foundation for our subsequent researches on grasses. It was obvious that a similar survey of the herbage ought to precede all further inquiry. With this in my mind, I approached the Minister for Agriculture and Stock, Hon. Frank W. Bulcock. Mr. Bulcock was keenly alive to the possibilities of this inquiry, promising and rendering much help in many directions. I take this opportunity of expressing my sincere thanks to the Minister. Without his assistance most of our researches on grasses, soils, and herbage would have been hampered on many occasions.

Mr. Bulcock readily gave permission for the Government Botanist to visit Bybera and make the desired survey of the herbage. The result of Mr. White's investigations, combined with the knowledge we had gathered previously, was startling. Our own information, I may mention, had been based on observing what cattle, sheep, and horses fed on at different seasons of the year; *above all, on closely watching what they preferred eating.* The upshot of all this: On a holding of 13,000 acres there is a number of plants amongst the native herbage which are capable of being used as vegetables by man. These native plants resemble the following vegetables we are familiar with:—*Spinach, cabbage, carrots, cress, radishes,* and above all, *salad leaves.* It is quite likely that many more may be added to this list by surveying them at different seasons of the year. Moreover, Mr. White purposely confined himself to those which were most abundant, and because of that could be gathered without much trouble; that were, so to say, *within reach of everybody, and therefore, of most practical use.* It seemed like gold lying on the surface and not being picked up. But the local importance is overshadowed by what this finding may mean for the State at large. Most of these plants are spread all over the western country. Many other plants useful to man which cannot be found on Bybera are growing in the Far West, where the need for green vegetables is most urgent. I made it my business to look up the scanty records available: the reports by the late Dr. Roth (Protector of Aboriginals), old Proceedings of the Royal Society of Queensland, &c. Since the publication of my article in the "Courier-Mail" recently, many communications have reached me from correspondents from the West full of instructive hints new to me. They were mainly from ladies who had practical experience in preparing these native vegetables for the table. My own qualifications are weak on the cookery side, and I am deeply appreciative of this additional information. When one receives these letters from women eager to do their best for their men-folk, and anxious that their children should not wilt because of the lack of green foodstuffs indispensable to them, it is brought home to one *how widespread is the need for green vegetables in the West, and how urgent is the need for early action that will make good the shortage. I am merely voicing what many feel.*

LIST OF NATIVE VEGETABLES.

Let me mention a few of our Bybera native vegetables:—



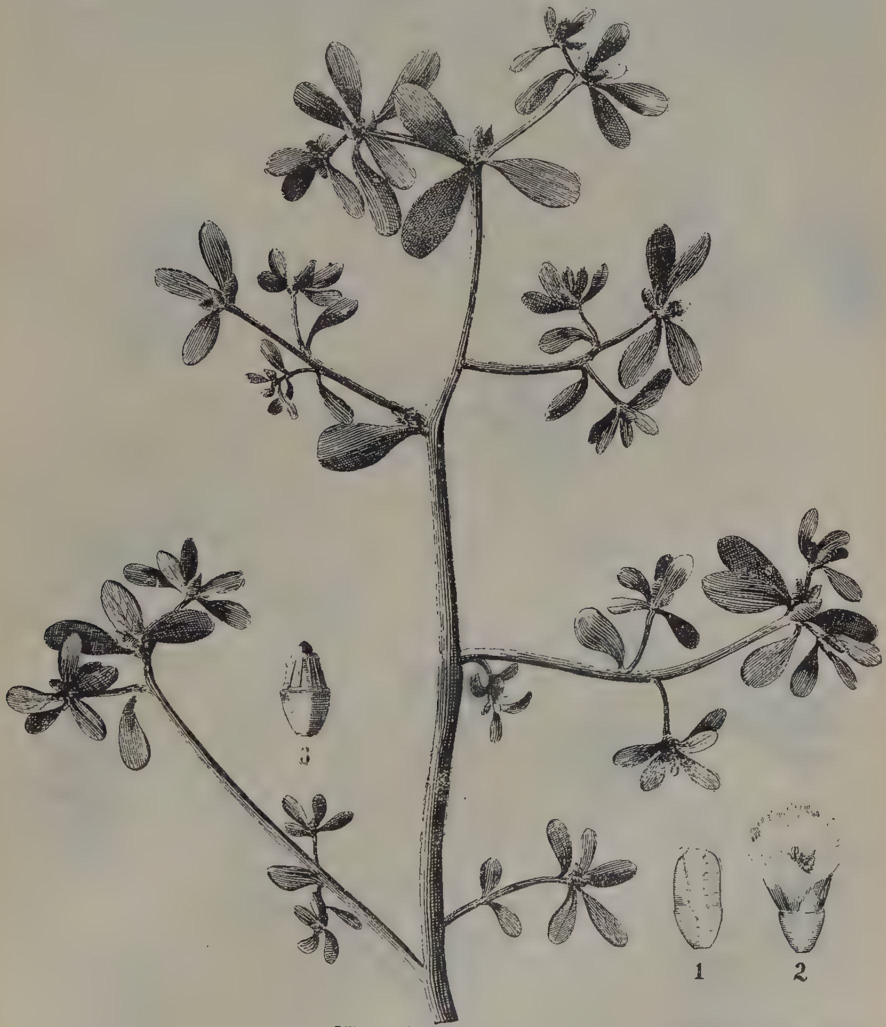
[*From "The Forage Plants of Australia," F. Turner* (*New South Wales Department of Agriculture,* 1891).

Plate 137.

Tetragonia expansa, Murr.—"Warrigal Cabbage," "New Zealand Spinach."

New Zealand Spinach.

It is also known as Warrigal cabbage, its botanical name is *Tetragonia expansa.* It is plentiful not only over the western country, but all over the State as far as the coast line. Its history proves once more that a prophet has no honour in his country. It came by its name through being first imported into England from New Zealand. Mr. Bick, the Curator of the Botanic Gardens, informed me that Lord Lamington, when he came to Queensland as Governor, insisted that this New Zealand spinach be cultivated in his kitchen garden. In the West it leads an unappreciated existence.



[From "The Forage Plants of Australia," F. Turner (New South Wales Department of Agriculture, **1891***).*

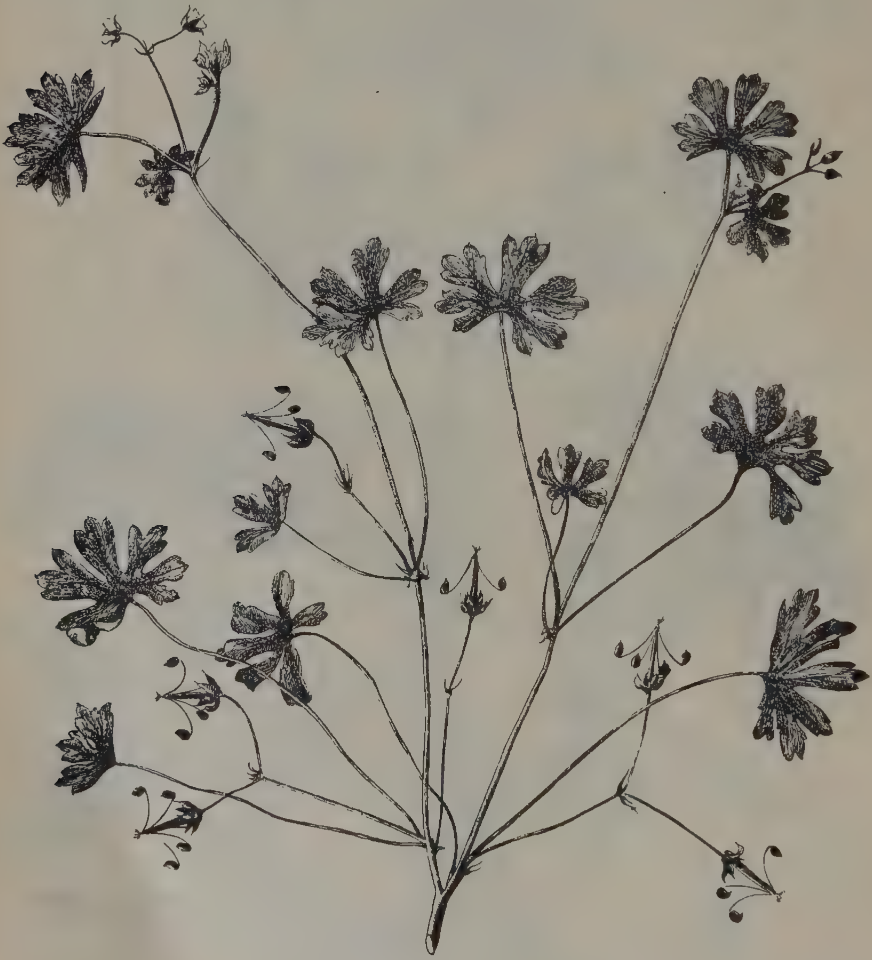
Plate 138.

Portulaca oleracea, Linn.—"Purslane."

Pig-Weed.

The pig-weed is one of the most common "weeds" in the West, as well as in the coastal belt. It grows plentifully on unoccupied allotments all round Brisbane, and since attention has been drawn to its usefulness as a table vegetable many people have gathered the pig-weed and tried it both uncooked as a salad and lightly cooked as a substitute for cabbage. The more aristocratic name of pig-weed is *purslane,* but the man in the bush would hardly know it by that name. Besides the stalks and leaves, it has a big tap root which is not unlike radish. The Oxford dictionary defines purslane as a low succulent herb used in salads and pickles. Its botanical name is *Portulaca oleracea.*

The plant produces seed in abundance, and they germinate so readily that this explains its rapid spread in vacant allotments. The very fact that pig-weed abounded during the recent dry spell while there was such a scarcity of European vegetables, proves that in the absence of rain the immigrant vegetable cannot compete with the native article.



[*From "The Forage Plants of Australia,"* F. Turner (*New South Wales Department of Agriculture*, 1891).

Plate 139.

Geranium dissectum, Linn.—"Crane's Bill" or "Crow's Foot."

Parakeelya.

Parakeelya belongs to the same family as pig-weed. It possesses thick fleshy stalks and leaves of similar character. Both of them are full of moisture. It is much appreciated in the West, where sheep can live a long time on it, as the parakeelya serves them not only as feed, but the high water contents of the plant also assuage the thirst. It has bright pink flowers, and can be eaten both raw and cooked.

Native Carrot.

This is the wild geranium (*Geranium dissectum*). It is a perennial plant capable of resisting lengthy droughts. This is mainly because of its lengthy root stock, which penetrates the earth for many feet in search of water. The roots swell in places and resemble carrots, hence its name. This carrot is appreciated both by man and beast. The aborigines used to roast these carrots, but they also may be eaten raw. Sheep are particularly fond of them. In drought-stricken country where no grass is visible above the surface, you can see sheep rummaging the ground until they have unearthed some of these carrots. You can tell that wild geranium is about by the sheep having blackened teeth from having burrowed in the soil. As long as a portion of the root stock survives, the plant will spring up from the ground as soon as rain falls; it flourishes in the spring before the summer grasses have made their appearance.

Old Man Saltbush.

The saltbushes are a large family thriving all over the interior of Australia, but the greatest of them all is the old man saltbush. It is a plant *that lasts longer than the drought*. There is practically no end to its usefulness as a native vegetable and as a stock fodder. Because it is so much appreciated by all sorts of animals, it is eaten down by the stock wherever they can get at it. The whitish green leaves are rich both in mineral and vitamin contents. You can see men and children pluck a handful of leaves and chew them. Placed in corn-beef sandwiches they are a most wholesome addition. We have them in the place of lettuce between bread and butter at afternoon tea. When boiled, including even the tender young stems, they make an eatable spinach, and other leaves can, of course be made into salad. What makes the saltbush so valuable as a vegetable is the fact that its fibre content is so low. Hence it is easy of digestion.

Apart from old man saltbush, there is quite a number of other saltbushes which may be available for human consumption. Creeping saltbush is most abundant on Bybera, although nothing like as popular as old man saltbush as far as the stock is concerned. It ought to be palatable when cooked as spinach, although we have not tried it yet in that form. The whole family of saltbushes requires thorough investigation from the point of view of being a useful vegetable for human consumption, as nearly all of them are greatly favoured by the stock.

This is only a brief and incomplete list of native vegetables. There are many more available as food for man. A systematic survey will bring forth a great number. My object was not so much to produce a complete and final catalogue as to draw attention to the fact that *Nature has provided us in Australia with many native vegetables, which in wet and dry season, can take the place of European vegetables, or at any rate supplement them.*

Plate 140.
Saltbush on Bybera, 7 feet high.

SURVIVAL OF NATIVE HERBAGE.

The man who grows his own cabbage in his back yard knows that he has little chance of obtaining a good cabbage unless he waters it daily; otherwise it will become stringy and uneatable. This man will be hard to convince that a succulent vegetable can grow in the West where little or no rain may fall for many weeks or months. Yet the native vegetables may flourish in this dry, hot country, where ordinary European vegetables would perish. It is a fascinating study, enquiring into the causes that enable the native herbage to survive under such adverse conditions.

The plant which grows in a climate of insufficient and unreliable rainfall is altogether differently constituted. Transpiration is a big factor in the life of each plant. The root draws up moisture and nourishment from the soil and sends it up through the stem into the leaves. There the nourishment is absorbed while the excess of moisture is given off through the pores of the leaves. Thus a constant stream of water is drawn up from the roots, the bulk of which goes back to the atmosphere. That is the reason why the European cabbage has to be watered each day to make good the loss by transpiration. The plant as a matter of fact sweats just as man does.

Much of the native herbage is built on different lines in a dry, hot climate. The moisture which is drawn up from the roots is a precious article, not easily replaced, and, therefore, cunningly husbanded. Take two plants which are known to everybody, the hydrangea and the

Plate 141.

A FINE SPECIMEN OF KURRAJONG, A USEFUL NATIVE TREE.

Of the seeds of the Kurrajong, Turner in his "Forage Plants of Australia" writes:—"The number of seeds in each follicle is about 20, and, according to Mr. Hamlet, Government Analyst, they contain 1.8 per cent. of caffeine, which is more than the coffee of commerce. If these are roasted, pounded, and macerated in hot water, with a little sugar added, when allowed to cool it makes a capital beverage. The roots of this tree, which resemble turnips in consistency, but are sweeter to the taste, are used by the aborigines as an article of food."

prickly-pear. The hydrangea only thrives with abundant watering, while the prickly-pear will endure the most lengthy drought in the West, where the hydrangea would have no chance of living even for a fraction of the time. Yet, cut off one of those prickly-pear leaves which may have had no rain for many months, pull back the thick outer skin and you will find a moist spongy tissue. It has been computed that the hydrangea, weight for weight, loses 500 times more water by transpiration than the prickly-pear does. How does the prickly-pear manage it? In the first instance its pores are few and far between. Instead of opening on the surface they are sunk below the surface. These pores, moreover, are surrounded by cells which act as a guard—they close up the pores during the daytime, particularly when a dry, hot westerly wind is blowing. At night-time these guard cells relax their watch, open the pores, and enable the plant to soak up any dew that may be falling.

The dew is a factor which is generally left out of calculation. We constructed on Bybera a dew gauge to measure the amount of dew, and reported the result at a meeting of the Royal Society. The highest amount we found was 3 points, which is equal to 3 tons of water per acre. Admitting that this is an exceptional case, even much smaller amounts of dew must play a big role in maintaining the life and condition of the plant.

Another contrivance which distinguishes many plants in the West, is that both stem and leaves are waterproofed with a waxy substance which carefully economises the precious watery contents beneath that skin. Look at the cabbage, how it stands upright with its broad leaves exposed to the sun and the drying winds. Compare with it the native vegetable. Its thick fleshy stalk mostly creeps close to the ground. Many of these plants, moreover, grow close to each other, thus obtaining shade and protection. When you cut open the thick fleshy stem abundant moisture is found furnishing, in many cases, not only food but sufficient water to assuage the thirst of man and beast.

All these contrivances enable much of the Australian herbage to save and store water during the dry months. The main source of the moisture is, however, in the soil itself. Take the native carrot named (*Geranium dissectum*). The stems are usually close to the ground, but its roots penetrate the earth to a great depth, where it goes foraging for water through many feet of soil. It will come as a great surprise to most people, as it did to me, how much water is really stored in the soil. At the end of last winter with its very moderate rainfall, I took twelve samples of soil from the surface down to a depth of 3 feet, and through the good offices of the Minister of Agriculture and Stock, Mr. Bulcock, these samples were immediately analysed as to their moisture content. The results were as follows:—

Sample No.	Anal. Nos. 2418-2429. Depth.	Moisture.
	Inches.	Per Cent.
1	3–6	10·7
2	6	12·3
3	9	12·8
4	12	13·0
5	16	12·2
6	18	12·0
7	21	12·1
8	24	12·6
9	27	12·8
10	30	12·5
11	33	15·0
12	36	12·2

These figures prove that roughly 12·5 per cent., or one-eighth of the substance of the samples submitted from the Bybera soil, consists of water. Each foot of earth spread over 1 acre of ground weighs roughly 1,500 tons; hence as the moisture content is one-eighth of the whole of the weight there are nearly 200 tons of water stored in each 12 inches of soil over a surface of one acre. Two hundred tons of water correspond to 2 inches of rain per 1 acre. If the root stock of the native carrot only penetrates 3 feet in depth it would have a storage reservoir of 600 tons of water, equal to a rainfall of 6 inches, to exploit. These samples, it must again be pointed out, were not taken after an abundant rainfall, but at the end of winter before the rain came in October and November.

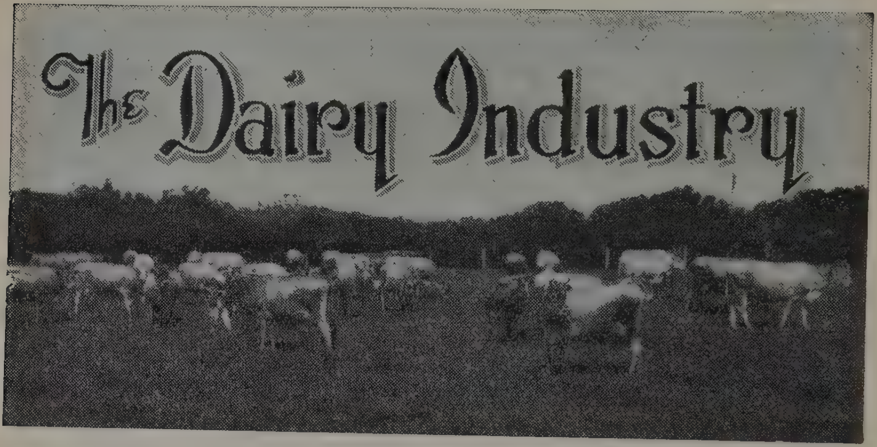
The remarkable capacity of the Australian soil in the brigalow and belah country to store water is mainly because of the colloidal character of the subsoil. While sandy country after a rainfall parts with its water readily, the colloidal subsoil in the West stores the water for great lengths of time. Around each particle of soil with its moisture contents a thin colloidal film is formed which prevents evaporation, and the stored water within this film remains there till the chemical action of the roots dissolves the film and makes it available to the plant. *It is this colloidal character of the subsoil which forms the foundation of the wealth of the western country of Queensland. It is a source of wealth greater than all the gold mines of Queensland.* The occasional or periodic rainfall is stored in the ground and made available to plants and grasses in the drier season.

Incidentally, it also explains why *succulent native vegetables can grow in the West through long periods of dry weather.*

THE CALL OF THE COUNTRYSIDE.

In the old country they are still worried about the continual drift of population from the country to the towns. Apart from points in farming practice and live stock feeding and breeding, the thing that impressed a recent visitor to the Old Land most was this drift to the cities which, he said, is producing a disastrous effect on the economic balance of the country and in the distribution of employment. "I cannot imagine," he went on, "that there would be in any quarter dissent from the simple proposition that the maintenance of a strong and vigorous agricultural population is essential to the wellbeing of the nation." Then he went on to say that to read the arguments for, and against, schemes for agricultural development it might be thought that the whole matter consists of little else than bookkeeping by double entry. "Are not men and women as important as material wealth?" he asked. "Consider for a moment the way Germany is tackling her agricultural problem," he added. He saw thousands of the youth of that country mobilised for land work in labour camps, with the dual benefits to the State of providing a reservoir of man power whose physical fitness is unsurpassed, and at the same time bringing into intensive cultivation every available acre of farming land.

British people, however, do not take kindly to regimentation. but even if we dislike the German methods there is no sense in ignoring their results. All will agree that the foundation of any plan to build up a better and sounder race is to preserve and foster a healthy population on the land. This is a fact consistently proved by the history of the rise and decline of nations.



The Importance of Blending Cream.

AN examination of cream on the receiving platform of almost any factory will indicate the necessity for careful treatment and storage on the farm. Proper blending of the cream after separation is essential.

The process of cream ripening assists the production of delicate butter flavours.

The development of lactic acid in the cream is desirable, because the lactic acid bacteria, if present in large numbers, prevent the undesirable off flavours and taints from developing.

Small quantities of cream are more difficult to hold in a satisfactory condition than larger quantities, and, consequently, the dairy farmer should keep his supply in as large a bulk as possible.

Objections to blending have been raised by some dairy farmers, who claim that if the cream from each milking is kept separate, only portion of the supply will be graded second-grade when sent to the factory. To this objection, however, it might be stated that the aim of dairy farmers to-day is, or should be, to have all and not merely part of their cream of the highest "choice" quality.

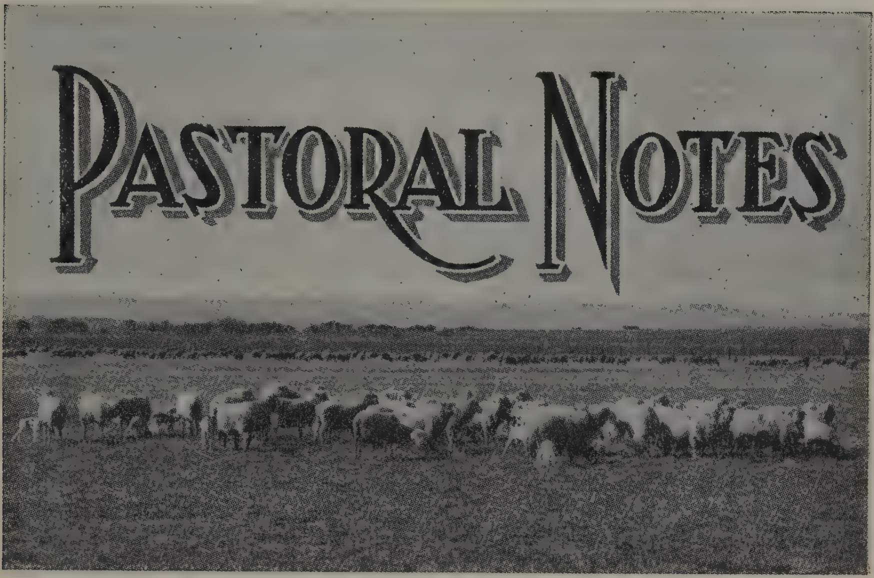
To blend correctly, the cream from each separation is first cooled for about an hour before adding to the bulk supply, which should always be kept as cool as possible.

If the use of the cooler and aerator has been effective, the cream should then be ready for blending—the farmer must satisfy himself, however, in all cases that the cream is sufficiently cooled before attempting to add it to the bulk.

Thorough and frequent stirring with a metal stirrer is necessary for correct blending.

If two or more cans are to be sent to the factory, approximately equal portions of the cooled cream from each separation should be placed in each can. This will ensure that a standard cream is supplied.

—*E. B. Rice.*



Care of Sick Animals.

STOCK owners are frequently required to diagnose and treat sick animals and, from their constant observation of stock in good health, are quick to notice any abnormal behaviour due to sickness. A knowledge of the normal temperatures, pulse and respiration rates of various animals is most valuable in arriving at a correct diagnosis of the trouble. The temperature of all young animals is somewhat higher than that of older animals, and various influences—such as periods of oestrum (heat), time of day, external temperature, and so on—may alter the temperature of the mature animal. The temperatures of healthy farm animals are—horse, 99.5-101 degrees; cow, 100-101 degrees; sheep, 103 degrees, pig, 102.5 degrees.

The temperature of an animal is usually measured in the rectum, and a self-registering thermometer such as is commonly used in ordinary medical or nursing practice may be used. Care should be taken to see that the column of mercury is shaken down. A small quantity of vaseline smeared on the bulb as a lubricant to assist the passage of the instrument is desirable, and it is inserted with a circular motion between the fingers, forward in a line with the backbone, and allowed to remain for a few minutes before it is withdrawn carefully and the reading taken. If the temperature of an animal is found to be about 2.5 degrees above normal it is said to have a low fever, if it reaches the vicinity of 4 degrees above normal a moderate fever is indicated, and if in the neighbourhood of 6 degrees above normal it has a high fever.

In some diseases, such as tetanus and sunstroke, the temperature may be as much as 10 degrees above normal. Having decided by use of the thermometer whether the sickness is of a febrile (pertaining to fever) or non-febrile nature, treatment and nursing must be considered.

Good nursing is of the utmost importance. The patient should be provided with a soft bed, shade from sun, wind, or rain, and a rug in cold weather. A supply of water and green feed also should be provided if possible.

Medicines are usually administered by the mouth in the form of a drench, and it is necessary to use care and patience when using this method. The head of the animal should not be raised above a horizontal position, and only small quantities of the drench poured into the mouth at a time, allowing time for swallowing. Pinching the throat to induce swallowing should not be practised, and the head should be lowered if the patient commences to cough.

BRUISING IN CATTLE.

The meat export industry is seriously prejudiced by the bruising of cattle when travelling to the meatworks, and the annual loss to both the owner and the State is considerable. Bruising is caused by many factors, particularly so when journeys are long, but the two chief causes are ill-treatment and horning, because of faulty supervision during trucking and in transit.

Cattle travelled to market on the hoof always give a higher percentage of first-class beef than railed stock, provided, of course, they have the condition and weights essential for export. Much of the bruising attributed to train travelling is caused in the trucking yards. In many instances, every endeavour is made to load the trains in a minimum of time. This is a mistake. Care should be taken to avoid crowding in gateways, because, where jamming occurs, the outer beasts are bruised on ribs and hips. Precautions are necessary both at the crush entrance and in the crush. If cattle are trucked in "single file," their sides do not come in contact with the rails. Drovers in charge should insist that no unnecessary force is used to drive the cattle, for every injury affects the quality of the carcase.

Competition in the chilled and frozen meat trade to-day is keen, each competing country endeavouring to produce a better carcase. Therefore, if Australia is to retain or increase her output of first-grade beef, the cattle received at the meatworks must be of prime quality and free from injuries of any kind. Growers and dealers may assist the trade by judicious handling of stock. Dehorning is essential. This is a simple operation and should be done when branding. Records prove conclusively that polled cattle give a much higher percentage of first-quality beef than horned cattle.

Dehorned cattle are also much more docile in the paddocks, cover less country when feeding, and retain condition longer.

PROTEIN AND MEAT MEAL.

Protein meal is a meat meal prepared from the clean edible portions of viscera of animals slaughtered, inspected, and passed for human consumption, together with carcases which have been rejected because of some fault rending carcase unsuitable for human food. The carcases of immature calves are also utilised for purposes of stock food manufacture. In process of manufacture of protein meal, a soft bone meal is added to the meat to assist in more complete treatment of the meal when passing through the grinding and sieving machinery. The whole mixture is then subjected to cooking at 60 lb. steam pressure for 4 to 6 hours, the time varying with the assortment of the charge (i.e., the mixture). Further heat treatment is then required to render the fat highly mobile for purposes of separation from the crackling (or remaining fatty fibrous matter). This treatment alone is sufficient to render the finished article sterile and free of risk from a disease point of view, hence protein meal is quite a safe product to use.

Meat meal is a stock food prepared in a similar manner to protein meal, but the raw products consist entirely of livers and lungs from animals slaughtered and passed for human consumption. The carcases or viscera of animals condemned for tuberculosis are not used in the manufacture of protein meal, meat meal or any other edible line, and hence there need be no fear of transmitting disease through use of these meals; but it is essential in storing them to keep them in a dry place where there is a strong draught of air for this maintains the condition and prevents formation of mould and of objectionable odours.

◆

PASTURE MANAGEMENT.

Many of the pastoral areas in Queensland will soon be well covered with grass and herbage, as a result of recent rains. If further widely distributed summer rains fall—a likely prospect at present—a good autumn crop of long grass will be assured. The effect of this autumn long grass is to supplement the organic constituents of the soil. This augmented organic content will tend to maintain the fertility of the pastures. In ordinary circumstances, pastures should not be burnt off. This applies especially to sown pastures, such as paspalum and Rhodes grasses. The effect of a severe grass fire is to reduce greatly the potential supply of the organic constituents of the soil. If persisted in, the practice of burning off may result in sterility of the soil. It is possible that bush fires recurring annually form one of the principal factors in the reduction of the fertility of much open forest country to far below that of rain-forest country.

In burnt-over areas, an invasion of non-nutritious grasses may always be looked for. In particular, the farmer with paspalum pastures can watch for the entrance of carpet grasses and rat's-tail grass. The prompt eradication of these almost worthless intruders may mean the saving of many weeks of labour in two or three years' time, when, otherwise, these invading grasses shall have spread and seeded.

In paspalum pastures, ordinary white clover should be fostered. A good pasture of this kind can often be established by broadcasting a few ounces of white clover seed to the acre in a paspalum paddock. This can be done during autumn. Generally, white clover prefers a sandy soil.

—C. W. Winders.

Fat Lamb Raising

A Sheep Dip Suitable for a Small Flock.

JAS. CAREW, Senior Instructor in Sheep and Wool.

FOLLOWING are particulars of an unusual type of sheep dip suitable for a small flock, which was inspected recently on the property of Mr. James Porter, Wallan View, Miles. The design was taken from that of Mr. W. A. Raff, Karara, who kindly supplied the subjoined particulars of its construction:—

With the accompanying photograph and cross-sectioned sketch as a guide, little trouble should be experienced in constructing this type of dip at a very small financial outlay, viz.:—

	£
12 bags of cement at 5s.	3
Hired help	2
Total	5

Details of Construction.

Make an excavation 7 feet 10 inches in diameter and 4 feet 6 inches in depth, great care being taken to keep the sides perpendicular. Next sink a hole about 2 feet deep in the centre of the excavation to set in concrete strainer post, 6 feet 6 inches by 12 inches in diameter, then roughly cement all the bottom of the excavation about 3 inches thick and allow same to set. Cut both the top and bottom out of an old 1,000 gallon squat tank, 7 feet 4 inches by 4 feet 2 inches, and place it in the excavation. If the excavation is true, it will be noticed that there will a space of 3 inches between the tank and sides. Mark off a width of 4 feet where you require your walk-in-and-out, and pack and ram concrete all the rest of the way round between the tank and sides of the excavation. Then give the bottom a final coat of fine cement about an inch thick, and allow it to set completely. Cut a part of the tank away from the 4-feet space left for the walk-in-and-out to within 1 foot from the bottom. From about 6 feet back, slope a cutting 3 feet 6 inches wide down to about 6 inches from the bottom of the hole and

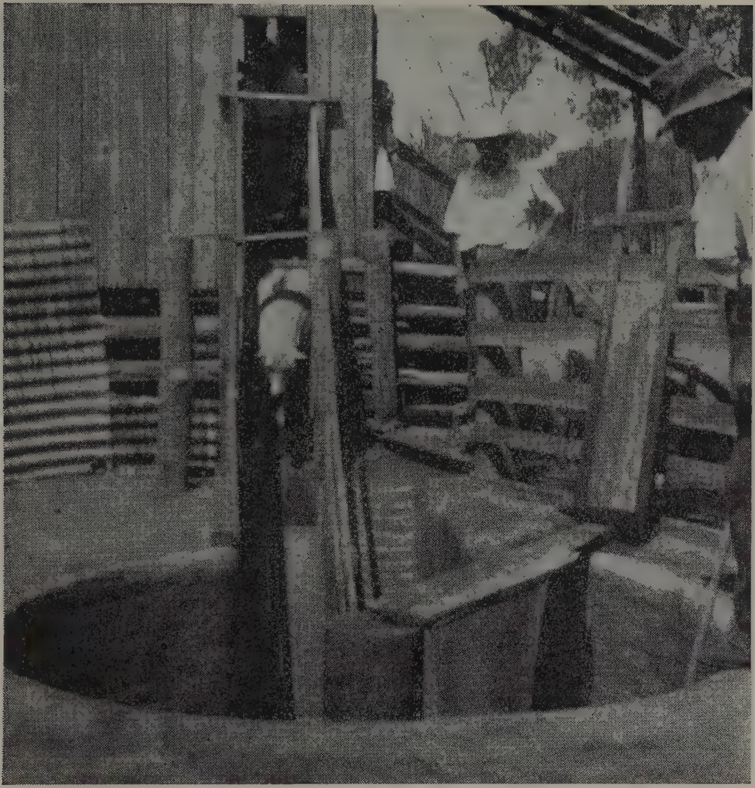
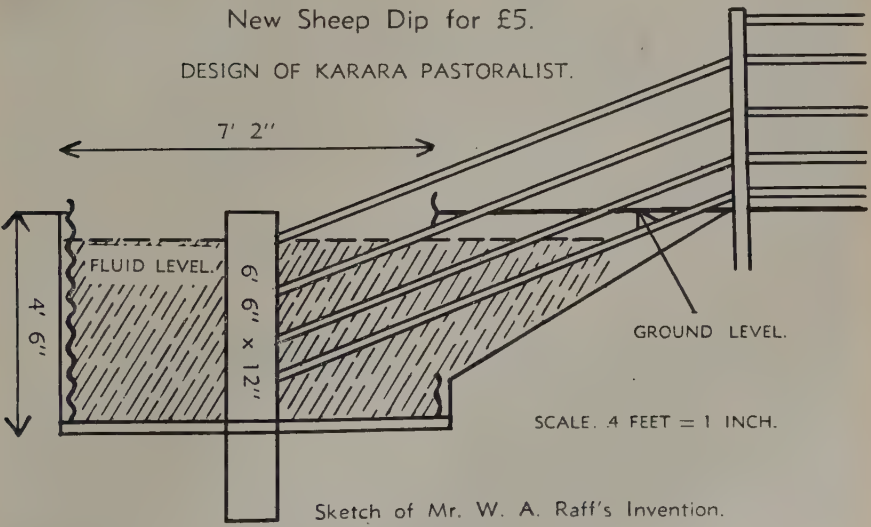


Plate 142.
A new type of Dip for the small Flockowner (see sketch below).


New Sheep Dip for £5.
DESIGN OF KARARA PASTORALIST.
7′ 2″
4′ 6″
FLUID LEVEL.
6′ 6″ × 12″
GROUND LEVEL.
SCALE. 4 FEET = 1 INCH.

Sketch of Mr. W. A. Raff's Invention.
Plate 143.
Sketch Plan of Dip pictured above.

round the corners off back to where the tank has been cut away. Concrete both the sides and bottom of the cutting about 6 inches thick and then cement inside of the tank. From the centre strainer post run a fence back through the middle of the cutting—thus utilising one side for the walk-in and the other for the walk-out, this side being battened to facilitate an easy exit.

With the simplicity of construction of this dip, it can easily be placed at a corner of the shed yard, and when small flocks have to be dipped, two small draining pens of 7 feet by 6 feet will be found sufficient, while a small ramp along the entrance race will prevent dirt being carried into the tank.

As many as 300 sheep has passed through this dip in an hour, while 1,200 have been treated similarly during a morning. It will be noticed that the sheep have a swim of approximately 21 feet, and for larger numbers, of course, a bigger tank could be made, while practically no expense is necessary for the erection of new yards.

The cost of construction will naturally vary a little according to the facilities available. The dip illustrated was constructed in very hard, rocky country with access to good sand and gravel.

Finally, for the best results we recommend the use of either Quibell's liquid or powder dip.

Such an inexpensive dip should be a valuable asset to the small flock owner.

SCRUB FEEDING OF SHEEP.

Edible shrubs and trees which are useful as a supplementary ration for sheep cover a large area of Queensland. Methods of feeding vary according to the class of edible bushes available. Stock owners accustomed to scrub feeding make full use of the varieties available and proportion the day's supply to vary the feeding to best advantage. Although some of the shrubs and trees are not relished under normal conditions, the intensity of a drought gradually reduces the sheep to starvation point, and it is then that whatever top feed is on the property should be made full use of. The system of making this available to the sheep varies according to the habit of growth, but there are few now who destroy the tree to feed the sheep. Lopping is the usual practice.

The digestibility of many of the edible varieties of vegetation leaves much to be desired, consequently they are very poor substitutes for grasses and herbage. When the stage is reached at which the sheep begin to lose condition, and before they fall away to any appreciable degree, scrub feeding should commence. At first the sheep are not inclined to eat much, and then only the most palatable portions. Very little need be provided at the start, and this should consist of a large proportion of the best available. As the sheep take to it, increase the supply, and gradually lessen the percentage of the most palatable until a well-based scrub ration is provided in keeping with the varieties available on the property. If sheep have to be scrub fed for a lengthy period, they are likely to develop digestive disorders, but this is influenced by the nature of the shrubs or trees they feed on. Some varieties will carry them on for many months without showing any ill effects on their condition, but a good lick should be of considerable help in retaining their normal health and condition, no matter what class of vegetation they are fed on. The water to which they have access should be the first point for consideration before preparing a lick, for during very dry weather sheep will drink much more water than they do when juicy food is available.

If the water is slightly salty, say 30 grains to the gallon, it can be considered normal, but if over that amount the salt in a lick may be reduced until the total reaches 250 grains to the gallon, when no salt is needed. Salt alone is not the only ingredient required in a lick as many other minerals, the chief of which are lime and phosphoric acid, are equally essential.

Analyses of most of our trees and shrubs show rather a low and an uneven mineral content, the lime being fairly well supplied, but they lack in phosphoric acid. Analyses also show rather high carbohydrate and usually a low available protein content. It may, therefore, be assumed that a lick should be based on the salt content of the water available and carry protein, phosphoric acid and lime. As sterilized bone meal carries these three ingredients, it is recommended as the base of the lick, say 60 parts. Other ingredients are salt, 30 parts; epsom or glauber salts, 5 parts; and molasses, 5 parts. As the protein content of bone meal is low, this ingredient can be added by using meals—such as cotton seed, peanut, wheat, linseed, or other such meal—all of which supply a most important want. Blood and meat meal, however, carry a greater protein content and may be used to advantage in supplying this element in a lick. Neither is attractive to sheep, however, therefore any mixture supplied should carry an ingredient to induce the sheep to take to it. If salt is lacking in the water, it may be used to advantage in inducing sheep to take the desired amount of mixed lick. In the absence of salt, cotton seed or similar meals are attractive, and the intake of lick regulated to about ½ oz. per head per day through their use. The action of a good lick is to stimulate the digestive organs and so whet the appetite as to cause the sheep to eat more and, at the same time, make better use of the food consumed—a decided advantage when scrub feeding.

Practically all our Western timbered country carries a proportion of useful edible shrubs and trees, which include a wide range of varieties (too numerous to mention here) growing over large belts of country. Too much value cannot be placed on the useful fodder trees of the West, and when scrub feeding becomes necessary every effort should be made while obtaining the feed to preserve them.

Jas. Carew.

DRENCHING FOR WORMS IN SHEEP.

About this time of the year worms are usually very troublesome in sheep. Before drenching, an effort should always be made to ascertain which species of worm is the cause of the trouble, and this can readily be done by a post-mortem examination of a badly-infested animal. The fourth stomach, small and large intestines should be cut open and examined carefully, and if the animals are coughing attention also should be given to the lungs.

For the worm that occurs in the fourth stomach—the barber's pole worm—bluestone is recommended. Carbon tetrachloride is also very effective against this worm, but there is some risk attached to its use, and it is therefore no longer recommended by the Department of Agriculture and Stock.

Bluestone and nicotine sulphate are used for the removal of the small hair worms, which inhabit the small intestine. Hair worms are the cause of a disease known as "black scours." Infestation is most severe among young sheep, in which the losses may be very heavy. Bluestone and nicotine sulphate is the only drench which is of any value against these small worms.

Where a mixed infestation of stomach worms and hair worms occurs—a frequent experience, especially in young sheep—the bluestone-nicotine sulphate drench should be given, as this drench is effective against the stomach worm also. Moreover, it may be used for the removal of tapeworms from lambs, although these worms may also be removed by arsenic and epsom salts.

For the nodule worms in the large intestine, there is as yet no efficient method of removing them by means of drenches which are given through the mouth. They may, however, be combated by the use of an enema containing sodium arsenite, which, if administered carefully, has a very high degree of efficiency.

Lung worms are treated with certain drugs which are injected into the windpipe, the formula being—

Oil of turpentine—1 cubic centimetre.
Creosote—0·5 cubic centimetre.
Olive oil—2 cubic centimetres.
Chloroform—0·5 cubic centimetre.

This formula represents a dose for one adult sheep. For lambs, the dose is reduced by one-half.

In country subject to worms, the sheep should be given treatment at regular three to four weekly intervals during the spring and summer months, for otherwise little or no benefit from the treatment may be evident. Treatment is to be regarded only as a temporary measure in the fight against worms, for it must be realised that when paddocks are heavily infested with worm larvæ the animal is no sooner freed of worms by treatment than it is attacked again by larvæ which are picked up by the animal when grazing. In about three to four weeks' time the larvæ have grown and have reached such a size and attained such numbers that the health of the animal is again affected.

Further information on mixing and administration of these drenches may be obtained from the Animal Health Station, Yeerongpilly.

DIPPING SHEEP.

Dipping is the only sucessful method of freeing the flock from lice and ked. For dipping, a recognised proprietary material should be chosen and the directions for mixing followed implicity.

Ordinarily, dipping should be done within a month after shearing, but not before all cuts or wounds have healed. A fine day should be chosen for the job. Extremes of heat or cold should be avoided.

Sheep should never be dipped when in a heated state. Yard them, if possible, the night before.

Immerse the sheep completely. Allow them to drain and, if possible, dry in the shade. Avoid driving them long distances to paddocks after dipping.

Dipping pays, and, in addition, gives some protection against the blowfly.

—*J. L. Hodge.*

CRUTCHING AND JETTING FOR FLY STRIKE.

There is often controversy as to whether crutching or jetting is the better method of combating blowfly attack. There should be no argument on this score, for, with the increasing severity of fly invasion, both methods have their place in the protection of the flock.

There is a school of thought which insists that the wool should be left on the crutch of the sheep and jetting alone resorted to. Other graziers pin their faith to crutching and will not consider jetting.

It is thought that, singly, either of these methods may be unsatisfactory to some extent, inasmuch as both methods should be used in conjunction. To get the greatest immunity from fly strike, the grazier is advised to carefully crutch when—or before if practicable—the first fly invasion is likely to occur. This should give the flocks immunity for about two months. Should further treatment then be necessary, jetting the previously crutched sheep is advised. Thus with the intelligent combination of the two methods, reasonable protection should be assured.

—*J. L. Hodge.*

LAMB COOKING TEST.

A comparative test made recently between the cooking qualities of Australian, New Zealand and United Kingdom lamb turned out very favourably for the Australian joint. This fact should be of great assistance to a scheme just launched for the popularisation of Australian meat in the Old Country.

The object of this scheme is to bring Australian meat under closer notice of the wholesale and retail trades.

THE QUEENSLAND AGRICULTURAL AND PASTORAL HANDBOOK.

Volume III.

CONTENTS:
Part I. Insect Pests and their Control.
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This new publication is indispensable to orchardists, market gardeners, farmers, and agricultural students, but it does not deal with sugar-cane pests and diseases.

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BRISBANE.

The PIG FARM

Points for Pig Exhibitors.

IN planning the exhibition of pigs at shows several important points must be kept in mind. The exhibitor should study carefully the prize schedule long before he proposes to exhibit, and should aim at having animals entered in the class or classes for which they are most suited.

The award for a class for boar over twelve and under eighteen months, or under two years, is more readily won, other things being equal, with a boar carrying all the age the class will allow than with a younger animal. The prize for sow with litter not more than eight or ten weeks old is more frequently won with a really good sow with a litter eight or ten weeks old than with an equally good sow with a litter eight or ten days old. Size for age is important. In a class for sow twelve months of age, the sow should be fairly forward in her gestation period. A sow not in pig at that age creates suspicion in the mind of the judge, and she does not or should not stand the same chance of winning. Mature animals should be guaranteed breeders. Pigs are judged on a performance basis, as well as on conformation plus pedigree, plus age.

Selection of Stock.—The possibility of securing premier honours, while depending very largely, under present conditions, on bodily conformation, colour marking, and freedom from faults, depends also on the time the exhibitor is willing to give to the preparation of his stock, and the businesslike attitude he adopts towards the job. Successful exhibitors spare no effort to ensure having their stock ready at the time of judging. Some animals are good feeders and are contented, others are stubborn and dislike strange surroundings—refusing to eat and losing bloom.

Condition and Management.—Show pigs should not be fattened to excess. This reduces their breeding capabilities. Fat covers a multitude of minor faults which should not be present in prize-winners. If pigs cannot win in medium breeding condition—other things being equal—they should not win at all.

Appearance catches the eye of the judge, whether it be of live pigs or of other exhibits. The animals should be shown in a clean, attractive condition. Warm water, soft soap, a stiff dandy brush, a softer oily brush, and a sharp knife for trimming the hoofs are necessities. Some pigs have overgrown hoofs, which gradually cause the forelegs to become inbent or the hindlegs misshapen. Removal of natural markings and clipping of the hair of pigs is objected to, and may result in disqualification. Clippers are not necessary in the show pig pen. For dressing the hair and softening the skin, a colourless oil should be used. Cocoanut oil is best, but rather expensive. Petroleum jelly is very useful. Some traders sell a special oil for pig dressing. The oil may be applied after washing: the objective is a clean, glossy coat of hair on a mellow skin.

Preparation and Exercise.—Avoid selecting animals with definite faults—such as an overgrown tongue, ears torn or damaged, and irregular markings. Bad tempered, snappy animals should not be exhibited.

Train the animals to move about at will and to become used to strangers. Mature animals should be paraded before the judge in order to show off their good points. Bacon and pork pigs and younger classes are not paraded at most shows, but they may be moved about judiciously in their pens.

Agricultural shows provide opportunities for displaying stock for sale that do not present themselves on the farm. Full advantage should be taken of such opportunities.

Finally, the exhibitor should be a good sport—a good loser as well as a good winner.

—*E. J. Shelton.*

PIG CARCASE COMPETITIONS.

The all-Australian export baconer and porker carcase competitions will be continued this year when judging will be held in London in June. Entries for this series will be due at bacon factories and meat works not later than the 15th April, 1939.

The competitions were started mainly to provide a means of demonstrating to Australian pig raisers the requirements as to type and conformation of the United Kingdom market. Australia's share of that market has increased steadily during recent years and, to enable Australian pig products to continue to compete, it is essential that the needs of United Kingdom consumers should be known and supplied. Prices are at present good for the Australian supplier, and, as exports are regulated, are likely to remain so.

Carcases entered for the competitions are judged in London according to a system of measurements and photographic standards devised by Dr. John Hammond and other English authorities. Marks are awarded for various points—such as body length, leg length, hams, shoulders—and a full list of these marks is supplied to each entrant to enable him to see how far and in what respects his pigs fall short of the ideal. Apart from the prospects of success in winning a prize—a sum of £25 is distributed in prizes in each section—the competitions thus provide a valuable service to entrants.

Entry forms may be obtained from meat works which treat pigs for export, the Department of Agriculture, and the veterinary officers of the Commonwealth Department of Commerce in each State.

—*E. J. Shelton.*

MAIZE AND PORK QUALITY.

Because of its relatively high fat content and the low melting point of its fat, maize can cause the production of soft fat in pork and bacon.

A sweeping statement is sometimes made that "maize fed" pigs are soft as compared with pigs which have been fed on wheat or barley. The statement really needs some qualification so far as Queensland pigs are concerned. A large number could be classed as "maize fed," but they rarely receive sufficient maize to cause soft pork or bacon.

Maize is the most widely grown grain in Queensland, but the pig industry is not dependent on this crop. It is very closely associated with dairying, the pigs being used primarily to consume the milk by-products—separated milk, buttermilk, and whey. Pasture, forage crops, and root crops also form a large part of the diet of pigs on some Queensland farms, and the grains—maize, wheat, and barley—are really only used as supplementary foods.

These points should be borne in mind when reading the advice of some overseas authorities, who state that maize should not constitute more than about 35 per cent. of the grain allowance of pigs. This may be sound advice under English conditions where pigs frequently receive a diet which is about 90 per cent. grain and which usually does not contain milk products, but under Queensland conditions, where the feeding systems are as stated, there appears to be little danger of pigs receiving sufficient maize to injure their carcase quality.

Most of the pigs produced in Queensland can be classed as "milk fed."

—*L. A. Downey.*

POINTS OF A GOOD BOAR.

When selecting a boar the best available should be bought, for during his life he may be the sire of hundreds of pigs, while the sow can only produce a limited number. If the boar is good he will improve the standard of the herd. His selection, therefore, is of very great importance.

The boar should come from a large, thrifty litter, and be obtained from a reliable breeder. He should be a little more on the compact side than the sow, not too chunky or short, but showing full development at every point, and of a strictly masculine type representing the full type of his breed. He must show quality, smoothness and evenness in every part, have a typical masculine head, with eyes and ears wide apart, the jowl reasonably full and well laid on to the shoulders, which should be smooth and free from wrinkles. He should have a full heart-girth extending well down to the bottom lines, nearly or quite on a level, with as deep a flank as possible. He should possess rather short or medium length legs, with bone of fair size and quality, pasterns short and straight, and the hoofs well set, legs standing square, straight and well under him. A long, wide and deep ham, and tail well set up are also desirable characteristics.

—*L. A. Downey.*

CHARCOAL FOR PIGS.

Digestive efficiency in farm animals depends largely on their ability to grind their food well. Thorough mastication is therefore linked with ease of digestion. Some animals may eat food rapidly without ill-effects. Thus the domestic fowl swallows quickly, but it has a remarkable mechanism in the gizzard for grinding the food to a fine state for subsequent digestion and absorption.

The pig is not so well equipped as the fowl to handle rapidly-eaten food, yet under most farm conditions fast eating is the rule. The pig can be helped to make better use of its foods in the following ways:—

(i.) By feeding easily digested material;
(ii.) By grinding the less digestible foods;
(iii.) By ensuring the animals sufficient feeding room;
(iv.) By arranging for some open grazing where the animals may eat at their leisure;
(v.) By feeding aids to digestion.

It is the last with which this note is concerned.

Charcoal and coke are extraordinarily cellular in structure and possess a great number of surfaces. At these surfaces rapid digestion of food can take place. By feeding either of them in powdered form, coarse lumps of food become coated with a film possessing an actively digesting surface.

An alternative and cheaper method is to throw coarse charcoal or coke into the pig sty and let the animals grind and eat as they feel inclined.

WHEN A PIG STY WAS A DIGGER'S COMFORTABLE CAMP.

The following extract from a letter from Mr. F. Elworthy, Mackay, to the Senior Instructor in Pig Raising, Mr. E. J. Shelton, will awaken memories of similar experiences of billets in France by many of our readers:—

During my service overseas with 108th Howitzer Battery, A.I.F., I now recollect my various experiences when billeted in farm houses in France and Belgium, where buildings of brick were provided for cows, horses, pigs, sheep, and rabbits.

Cows and other animals were housed and fed during winter, and tethered out on pasture in spring and summer. Hurdles made of woven brambles were used to enclose sheep on pasture.

On one occasion I cleaned out and disinfected a pigsty which made a very comfortable billet during our stay in that area.

Registered
Hatcheries

Name and Address.	Name of Hatchery.	Breeds Kept.
G. Adler, Tinana	Nevertire	White Leghorns, Australorps, Rhode Island Reds, and Langshans
F. J. Akers, Eight Mile Plains	Elmsdale	White Leghorns and Australorps
E. J. Blake, Rosewood	Sunnyville	White Leghorns, Australorps, White Wyandottes and Rhode Island Reds
J. Cameron, Oxley Central	Cameron's	Australorps and White Leghorns
M. H. Campbell, Albany Creek, Aspley	Mahaca Poultry Farm and Hatchery	White Leghorns and Australorps
J. L. Carrick & Son, Manly road, Tingalpa	Craigard	White Leghorns
N. Cooper, Zillmere road, Zillmere	Graceville	White Leghorns
R. B. Corbett, Woombye	Labrena	White Leghorns and Australorps
T. G. Crawford, Stratford	Rho-Isled	Rhode Island Reds
Rev. E. Eckert, Head street, Laidley	Laidley	Australorps, White Leghorns, and Langshans
Elks & Sudlow, Beerwah	Woodlands	Australorps and White Leghorns
W. H. Gibson, Manly road, Tingalpa	Gibson's	White Leghorns and Australorps
Gisler Bros., Wynnum	Gisler Bros.	White Leghorns
J. W. Grice, Loch Lomond	Quarrington	White Leghorns
C. & C. E. Gustafson, Tannymorel	Bellevue	Australorps and White Leghorns
J. McCulloch, Whites road, Manly	Hindes Stud Poultry Farm	White Leghorns, Australorps, and Brown Leghorns
A. Malvine, junr., The Gap, Ashgrove	Alva	White Leghorns and Australorps
H. L. Marshall, Kenmore	Stonehenge	White Leghorns and Australorps
W. J. Martin, Pullenvale	Pennington	Australorps, White Leghorns, and Langshans
J. A. Miller, Racecourse road, Charters Towers	Hillview	White Leghorns
F. S. Morrison, Kenmore	Dunglass	Australorps, Brown Leghorns, and White Leghorns
Mrs. H. I. Mottram, Ibis avenue, Deagon	Kenwood Electric Hatcheries	White Leghorns
J. W. Moule, Kureen	Kureen	White Leghorns and Australorps

Name and Address.	Name of Hatchery.	Breeds Kept.
S. V. Norup, Beaudesert Road, Cooper's Plains	Norup's ..	White Leghorns and Australorps
E. K. Pennefather, Oxley Central	..	Australorps and White Leghorns
G. Pitt, Box 132, Bundaberg ..	Pitt's Poultry Breeding Farm	White Leghorns, Australorps, Langshans, Rhode Island Reds, and Brown Leghorns
C. L. Schlencker, Handford road, Zillmere	Windyridge ..	White Leghorns
A. Smith, Beerwah	Endcliffe ..	White Leghorns and Australorps
T. Smith, Isis Junction	Fairview ..	White Leghorns and Langshans
H. A. Springall, Progress street, Tingalpa	Springfield ..	White Leghorns
W. J. B. Tonkin, Parkhurst, North Rockhampton	Tonkin's Poultry Farm	White Leghorns and Australorps
T. Westerman, Handford road, Zillmere	Zillmere ..	Australorps and White Leghorns
P. A. Wright, Laidley ..	Chillowdeane ..	Brown Leghorns, White Leghorns and Australorps
R. H. Young, Box 18, P.O., Babinda	Reg. Young's ..	White Leghorns, Brown Leghorns and Australorps

NEW REGISTRATIONS.

Following is a list of those who have applied for the registration of their hatcheries up to the 25th February, 1939:—

Name and Address.	Name of Hatchery.	Breeds Kept.
Dr. W. Crosse, Musgrave road, Sunnybank	Brundholme ..	White Leghorns, Australorps, and Rhode Island Reds
Dixon Bros., Wondecla ..	Dixon Bros. ..	White Leghorns
G. Grice, Loch Lomond ..	Kiama ..	White Leghorns
P. Haseman, Stanley terrace, Taringa	Black and White	Australorps and White Leghorns
D. J. Murphy, Ferndale, Marmor	Ferndale ..	White Leghorns, Brown Leghorns, Australorps, Silver Campines, and Light Sussex
H. W. & C. E. E. Olsen, Marmor	Squaredeal Poultry Farm	White Leghorns, Australorps, Black Leghorns, Brown Leghorns, and Anconas
A. C. Pearce, Marlborough ..	Marlborough Stud Poultry Farm	Australorps, Rhode Island Reds, Light Sussex, White Wyandottes, Langshans, Khaki Campbell and Indian Runner Ducks, and Bronzewing Turkeys
J. Richards, Atherton	Mount View Poultry Farm	
A. J. Teitzel, West street, Aitkenville, Townsville	Teitzel's ..	White Leghorns
W. A. Watson, Box 365, P.O., Cairns	Hillview ..	White Leghorns

REGISTERED HATCHERIES IN QUEENSLAND.

Registration of hatcheries is a scheme which has been adopted with the object of improving the class and health of the chickens sold throughout the State.

The principal disease to which young chickens are subject is known as pullorum disease, frequently referred to as B.W.D. (bacillary white diarrhœa). This disease is transmitted in the first instance from the parent to the offspring through the egg. It is a disease that is also readily transmitted to chickens during the first few days of life by the contamination of the food and water supply by the droppings of diseased chickens.

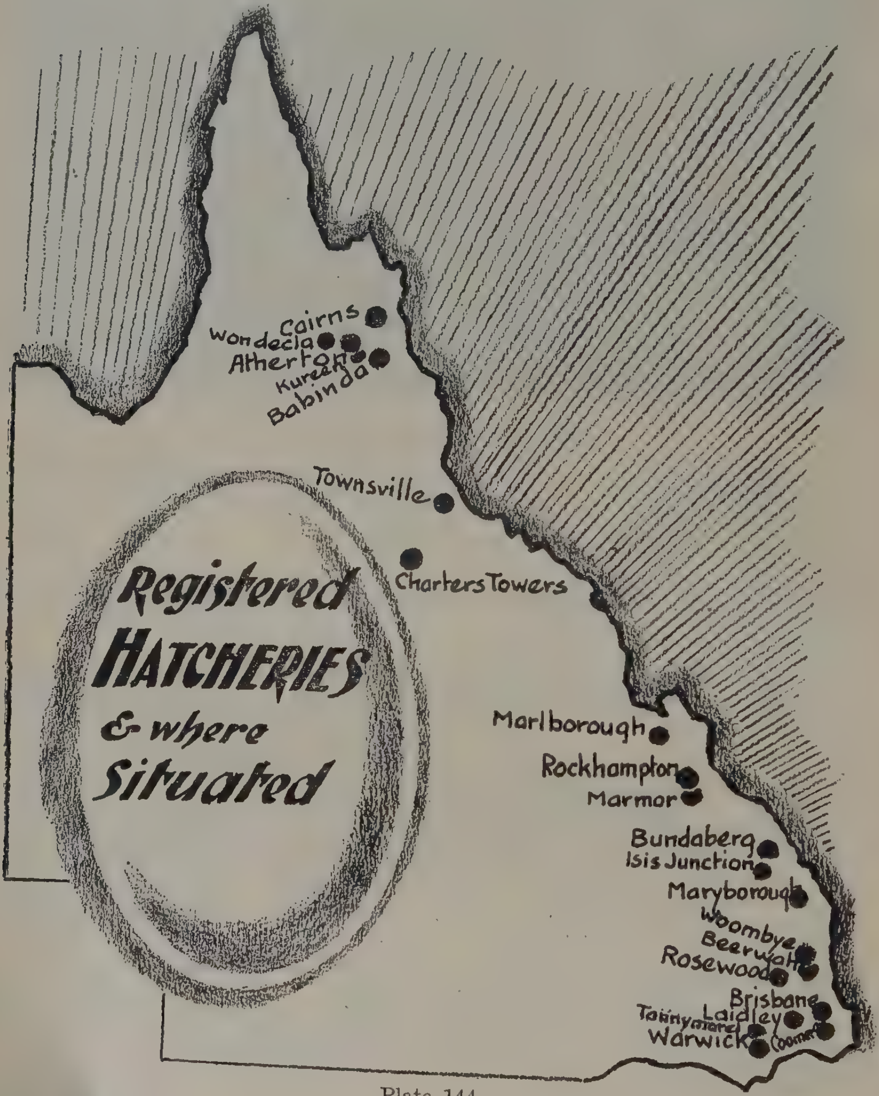

Registered
HATCHERIES
& where
Situated
Cairns
Wondecla
Atherton
Kureen
Babinda
Townsville
Charters Towers
Marlborough
Rockhampton
Marmor
Bundaberg
Isis Junction
Maryborough
Woombye
Beerwah
Rosewood
Brisbane
Laidley
Tannymorel
Warwick
Coomera

Plate 144.

There is no known effective treatment for pullorum disease, and control lies in the direction of the detection and slaughter of the adult bird that may be used for breeding purposes. The carriers of this disease are determined by a blood test, as the carriers usually appear to be quite normal. The testing is done by officers of the Department. At the time of testing, a rigid culling is generally practised, which is of great value in itself.

During the year 1938, the flocks of 34 hatcheries were blood tested, 33 being registered. To the end of February, 1939, 46 breeders have applied for the registration of their hatcheries, which will entail the blood testing of over 70,000 birds, consequently, registration of hatcheries is bound to have a marked influence in the efforts that are being made to eliminate pullorum disease.

The accompanying map illustrates the development of this scheme, and for the information of the public, a list of registered hatcheries, indicating the breeds that they have available, is published in this Journal from month to month.

THE PURCHASE OF POULTRY.

At this time of the year, the upward trend of egg values tempts many beginners, and also persons who keep a few fowls, to increase their income from poultry by purchasing pullets or hens. The idea is fairly sound, but there are numerous pitfalls for the inexperienced buyer.

Assuming that the beginner sets out to buy pullets about four or five months old, it is only natural to expect that the quoted price will have an important bearing on the transaction. For instance, if pullets four to five months old are obtainable from one source at 6s. per pair and from another at 10s. per pair, the cheaper lot may be bought.

The inexperienced buyer seldom appreciates the necessity for paying the higher price, as the birds are of the same age and breed. It should be borne in mind, however, that there is usually a definite reason for the difference in the price, and that difference can be summed up in one word—quality. The cheaper birds may have been culled from flocks, as the result of their being backward or stunted in growth. Such birds cannot be expected to commence egg-laying at the normal time and be profitable. If they are culls as pullets, it is unwise to breed from any of them. They cannot return a profit, irrespective of the purpose for which they are used.

After allowing for feeding costs and a slight increase in egg values, it is unlikely that the more expensive birds will show any profit during their pullet year. It is quite probable, however, that they will repay their purchase price. At the same time, many of these birds should make suitable breeders and their use for this purpose would be profitable.

Much the same applies in the case of hens. Cheap hens are usually unsuitable as breeders, whereas many breeding birds may be selected from the more expensive birds. The purchase of old hens is not good business, apart from their value as future breeders. Again, while the beginner may be able to distinguish a pullet before it begins laying, once production starts it is more difficult to separate hens which have just completed a moult and pullets which have been laying for a few weeks. It is also very difficult to distinguish between a hen that is fifteen months old and one four years old. This means that in buying alleged first year hens the birds could be any age above that mentioned.

In such circumstances, it is advisable for the prospective buyer to inspect the flock from which it is proposed to make the purchase before parting with his money.

—*P. Rumball.*

MARKING EARLY LAYING PULLETS.

Where the trap nest is not used, the marking of early laying pullets provides a practical method of selection.

Trap nesting records in different parts of the world show that—

(1) Early laying pullets are, as a rule, the highest producers;

(2) Birds that lay late into the autumn and are late in moulting are also high producers.

As the early layers and late moulters are high producers, a marking system will assist in distinguishing between profitable and unprofitable fowls.

In one convenient system of marking, a coloured leg band is placed on the left shank of all pullets which start to lay before six months of age. A band of another colour is attached to the left shank of pullets starting to lay when six and seven months of age, and a third coloured band is used for fowls which commence to lay in the eighth month. Pullets that do not lay until after the eighth month should be culled from the flock, or kept in a pen by themselves, and forced for egg production.

Pullets which are early layers show the following characteristics:—

(1) A large red comb;

(2) An active disposition and a ravenous appetite;

(3) Roominess between the keel and pelvic bones;

(4) An occasional disappearance of the yellow coloration round the vent in some yellow shanked varieties.

In small flocks, individuals showing the abovementioned characteristics may be caught in the nests and then marked.

During the following season, all fowls which were marked as late maturing the previous autumn and moult in December, January, and February may be culled. All the early laying birds and those that moult after 1st March may be kept for layers or placed in a special breeding pen and mated to a male known to have come from a high laying hen that has been trap nested. In this way the egg production of the offspring may be raised.

The points outlined provide a simple method of selection which will, properly used, raise the level of production in a flock.

—*P. Rumball.*

WORMS IN POULTRY.

Many young birds will now be commencing their first season of production. During the rearing of these birds diseases such as coccidiosis, pullorum disease, and roup will have taken their toll. These diseases are spectacular in their onset and the symptoms manifested and the mortalities experienced have compelled the poultry farmer to undertake control measures in order to minimise his losses as much as possible.

In many instances, however, worm infestation has been overlooked. The effects of worm infestation are usually insidious in nature, and being accumulative do not attract attention until the birds are seriously affected. Such effects include failure to make normal growth and even loss of weight, loss of appetite and activity, dull, ruffled plumage, and a paleness of the comb and shanks. The mortality, especially among young birds, may be serious. More important still, young pullets, while maintaining a ravenous appetite and being apparently in fair health, may not be producing their normal quota of eggs.

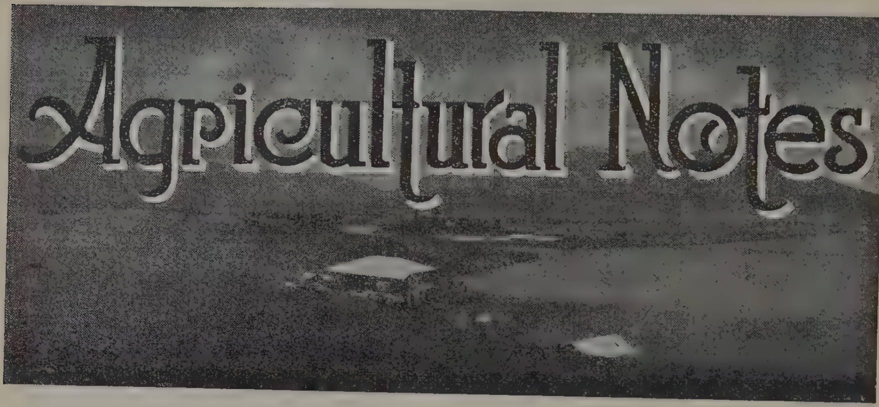
Of the various worms which infest poultry one of the most important is the large roundworm, which grows up to 4 or 5 inches in length, and is found in the intestine. Where the farmer pays careful attention to sanitation and cleanliness, this and other worms rarely become dangerous. By the regular removal of droppings and the adoption of other measures which promote cleanliness, the source of infestation is removed. Prevention of infestation is most important in the control of parasitic worms. There are, however, certain drugs which may be employed to remove the worms from the birds, and if treatment is employed regularly the infestation should be of no great importance. Treatment of poultry for worms may be undertaken either by mixing certain drugs with the mash (flock treatment), or else by giving the drug to each individual bird (individual treatment).

Flock Treatment.—Flock treatment can be applied with success only when the birds are kept under intensive or semi-intensive conditions. The procedure is to mix nicotine sulphate with the mash at the rate of ·5 cubic centimetre of nicotine sulphate for every 1 lb. of dry mash. The amount of nicotine sulphate required is incorporated with just sufficient water so that when mixed the mash is flaky. About 1 part of nicotine sulphate to 400 parts of water is usually adequate. The mixing should be thorough so that no lumps remain. This treated mash is mixed fresh daily and fed continuously for four days.

Individual Treatment.—The best drug to use for individual treatment is carbon tetrachloride. This may be given in capsules or by means of a syringe and rubber tubing. The birds are starved overnight and treated next morning. They may be fed immediately after treatment. The doses range from ·5 cubic centimetres to 2 cubic centimetres, depending on the size of the bird. If the springe is used great care must be taken to avoid delivering the drug into the windpipe, which would cause instant death. Before undertaking this treatment farmers should apply to the Animal Health Station, Yeerongpilly, for further details. —*Dr. F. H. S. Roberts.*

MOVING WITH THE TIMES.

To-day brains and education were never more needed to run a farm successfully. A knowledge of science—that is, the science that any level-headed farmer can acquire—ought, if directed properly, to put an enhanced value on our practical work. A little more study of the scientific side would help to lighten the drudgery now so much associated with the lives of many producers. Farm science with a reasonable amount of practical knowledge is the strongest sort of combination that could be applied to the task of getting the most and best out of a farm. Of course, we all know the farmer who says that he hasn't got time to waste on reading up what is new. But it is a good policy, and it pays to find out what other farmers are doing and what research workers are finding out, and what general progress is being made in the industry. Farmers, like everyone else, can't afford to stay in one place. We have to move with the times and make use of the latest knowledge and gadgets if we are to get what we should get from our land. —*New Zealand Farmer.*



Establishing Lucerne.

LUCERNE is grown for hay purposes chiefly in warm districts on deep calcareous soils provided with abundant moisture. In such situations heavy crops are produced over a number of years. Within recent years the cultivation of lucerne has been extended into fairly dry districts, but most success may be expected on soils rich in lime and with ample moisture available to the plants.

Land intended for lucerne is best cropped with a cereal—such as wheat, oats, barley, or rye—or panicums and millets—prior to its preparation for lucerne. Stubbles should be cultivated to induce volunteer growths of weeds and other seeds; these should be turned in subsequently by ploughing. For a first cultivation, two deep ploughings should be given at right angles to each other. Moisture should be conserved by frequent cultivation. In dry districts, where a good rainfall cannot always be depended upon at seeding time, fallowing is particularly necessary for the purpose of conserving moisture. The land may therefore be ploughed in late autumn or early winter the year before it is intended to sow. The depth of the ploughing is governed by the character of the soil. Alluvial soils should be ploughed to a depth of about 7 inches, but on other classes of soil of lighter or more porous nature a depth of 4 to 5 inches is sufficient. The ploughed land should then be allowed to lie in the rough state for a month or so and be broken down with harrows after summer rains. During summer the land should be frequently worked with harrows or cultivators, so as to allow neither growth of weeds nor the formation of a hard crust on top. If the seed-bed cannot be worked down sufficiently fine with the harrows, a one-way disc cultivator or roller will do all that is necessary. If the land is rolled, it should be harrowed immediately after the rolling. Where the soil surface shows a tendency to dry out just prior to sowing, a light ploughing may be given and followed by the harrows. Sowing on top of the harrowed surface, followed either by a light rolling or by brush-harrowing, is a good practice—but if rolling is adopted, a set of light harrows should be used immediately afterwards. Rolling assists in bringing the soil particles in closer contact with the seed and works in the same manner as compressing a partly dried-out sponge.

Lucerne is best sown in April or May, the young plants then being sufficiently well established before the onset of cold weather to enable them to survive. Provided the seed is drilled in, a sowing rate of 12 to 14 lb. per acre is ample, and often too much, in the best lucerne-growing districts. If hand broadcasting is practised, slightly more seed should be used. The rate of seeding should be lighter in dry districts, and for grazing purposes a seeding of as low as 2 lb. per acre is permissible. Seed sown on the surface should be covered by means of a light harrowing.

Though fertilizers are not used to any considerable extent in the main lucerne-growing areas, many growers have obtained payable results by applying up to 1½ cwt. of superphosphate per acre, either drilled in with the seed or used as a top-dressing. Nitrogenous fertilizers appear unnecessary.

Fully a month or six weeks will pass before the young root system becomes established and the lucerne is fit for its preliminary cutting by the mower. An early mowing, before the young lucerne flowers, acts as a pruning and stimulates the root growth. After the preliminary cutting, a light harrowing may be made if absolutely necessary because of foreign growths.

Often promising stands of lucerne, following good germination, are destroyed through cutworm attacks. Damage at this time is irreparable, for the blank spaces are filled with weeds which considerably lessen the value of the crop. The Paris green-bran cutworm bait broadcast at the rate of 30 lb. per acre gives effective control, provided it is distributed as soon as the depredations of the pest become apparent. The necessary materials should therefore be held in stock on the farm for emergency. Cutworms attack only very young lucerne and intelligently applied baiting is then quite safe. Bait distribution in established crops is undesirable because of the possible risk of stock poisoning.

PREPARATION OF WHEAT LAND.

Fields ploughed during December will now be in good physical condition, provided weed growth has been controlled by judicious cultivation.

Where sheep have access to the fallowed areas weeds will not be troublesome, but elsewhere every effort should be directed towards the eradication of all such growths. If it has been possible to control weed growth, all workings following the initial ploughing can be done entirely with rigid tine cultivators, or spring-tooth implements, and with harrows. Cultivation to the desired depth in order to break the crust and form a good surface mulch should be done soon after all substantial rains. As a firm seed-bed is required, it is important to progressively reduce the depth of working towards seeding time, particularly where sheep are not available to assist in consolidation.

Well prepared land containing ample reserves of moisture is often fit for sowing at a seasonable period, according to the variety selected, independently of favourable rains. On the other hand, hurriedly prepared land may have to await later rains to effect germination—a great disadvantage, for early or seasonably sown crops invariably give the best average returns.

The wheat yield for the 1938 season again exceeded the average annual return for the previous decade, a fact which can be attributed largely to the increased attention given to the thorough preparation of the land. The growers who consistently practise summer fallowing have been amply rewarded for their efforts during recent years when winter and spring rains have been under average, a fact which cannot have escaped the attention of neighbouring farmers.

Where wild oats and other weeds are assuming pest proportions, it is suggested that the land be sown to a good fodder oat, which can be grazed as required, ploughing in the residue in sufficient time to prevent the maturity of wild oat seed.

Weed infestation during the following year can thus be greatly reduced, besides providing valuable feed, and a rotation crop of benefit to the land.

LUCERNE ON THE DOWNS AND MARANOA.

Although comparatively few settlers in the Western Darling Downs and Maranoa districts have established lucerne stands it is significant that most of those who have done so plan a considerable increase in acreage. The qualities of lucerne as a grazing proposition, both for sheep and cattle, are gaining wider appreciation outside the recognised agricultural regions. The results obtained on scrub and forest lands during the dry spells of 1936 at Guluguba, Columboola, Wallumbilla, and other localities are very encouraging. An adaptation of lucerne to a wide range of soils, and a capacity for giving good results under adverse climatic conditions were clearly demonstrated.

In sowing lucerne high seeding rates are unnecessary and have been the cause of many failures in the past; 3 to 4 lb. per acre is quite heavy enough for the districts named.

With the wide variation in farming conditions and soil types that obtain in these districts, hard and fast rules regarding sowing are not practicable. The following points are, however, important:—Deeper sowing than ¾ inch is inadvisable in all soils, except those of a self-mulching nature where, if necessary, the depth may be a little greater —provided that there is sufficient moisture to give the plant a good start, in addition to germinating the seed.

Where old wheat land is to be converted into pasture, it is usual to sow the lucerne with the last crop of wheat. This method reduces costs to some extent; but, in soil that has a tendency to pack or cake after rain, it is advisable to drill the wheat in first and then follow with the lucerne—having the drill hoes out of the ground, and covering with light harrows. This avoids planting the lucerne at the same depth as the wheat—i.e., 2-2½ inches.

When broadcasting, it is difficult to get an even sowing with the small seed; but if two sowings are made, one across the paddock and the other in the opposite direction, a more even crop can be obtained. Only light harrows should be used to cover the seed.

On small holdings where more intensive culture is practised, a method of sowing which might commend itself to dairymen, particularly in the Maranoa district, is to plant lucerne in rows 18 inches to 2 feet apart. Inter-row cultivation may then be practised when necessary after rain. Established in this way, the plant has exceptional drought resistance and an area of green feed for emergency use is assured.

All settlers in the reclaimed prickly-pear country might well turn their attention to lucerne as a grazing crop. With light seedings, it is not expensive to establish and is well worth a trial.

GIANT SETARIA (GIANT PANICUM).

In the past more or less confusion has arisen in connection with the sale for sowing of so-called panicum seed—*Setaria italica*. Botanically the seed in question is not a panicum, but belongs to the genus Setaria, a common collective name for which is "foxtail millet."

At the present time, *Setaria italica* (so-called panicum) may be divided into three main types, viz.:—giant, dwarf, and an admixture of both. The so-called giant panicum offered for sale in Queensland is frequently a mixture of the giant and dwarf varieties. In order to clarify the position, it has been decided that the giant and dwarf varieties shall be respectively called giant setaria and dwarf setaria. To ensure that these products will not lose their identity so far as farmers and others are concerned, they should be referred to in catalogues and other publications as follows:—

Giant Setaria (Giant Panicum), and
Dwarf Setaria (Hungarian Millet).

It may be mentioned that the identification of the giant or dwarf varieties is comparatively simple, and is carried out by the Seed Testing Station, Department of Agriculture and Stock, Brisbane, a period of about fourteen days being required for the purpose.

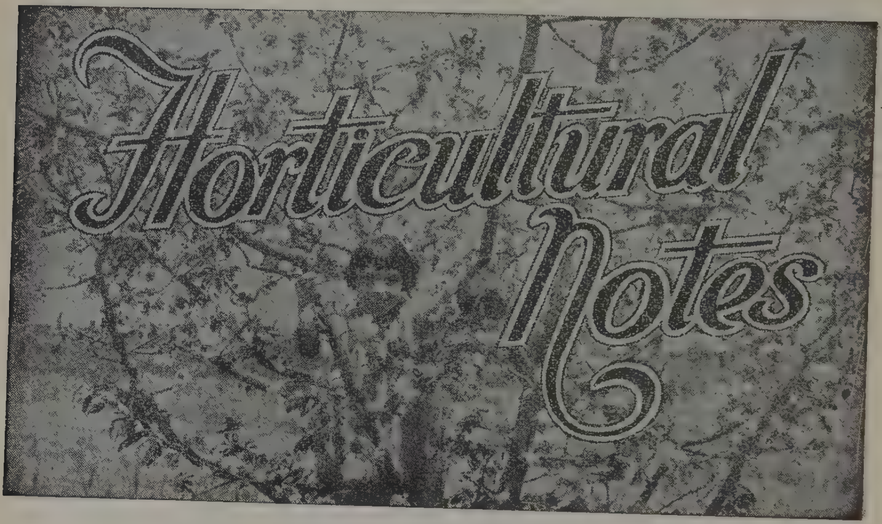
A CHEAP SILO.

Among recent experiments carried out at the Cambridge University Farm, England, is that of a new and cheap method of making silage from surplus grass. For the walls of a small circular silo, sisalkraft paper and woven fencing wire are used, based on a ring of concrete 18 inches wide, on which the wire stands.

Before building the silo it is necessary to provide for drainage (unless the soil is light, when drainage is not required), and, if a drain is put in, care must be taken that no air gets into contact with the ensilage. The paper is in four sections held by wooden grips, and here again it is essential that no air should be allowed to penetrate through the walls. When one section of wire and paper wall, about three feet high, is completed, a second section is built above, the wire fencing being one square narrower in this second ring. The silo, now six feet high and filled, is topped up, first with a layer of sisalkraft paper, then with bags, and then with eighteen inches to two feet of soil. The 6 feet temporary silo constructed in this way at Cambridge holds about 20 tons of material from five acres, and its total cost is £15 (English currency). The paper has to be renewed each year.

ALL FLESH IS GRASS.

It is remarkable how important grass is to us all. When we come to think of it, grass is the foundation of both human and animal life. The meat-eating animals certainly don't feed on grass, but without grass to fatten other animals they would die. Grass is the basis of all life on the land. It is the basis of all agriculture. Without grass man would soon perish from the earth. Looked at in that light, pasture renovation and management becomes really an expression of a natural instinct of self-preservation.



French Beans.

A CONSIDERABLE variety of beans is grown in Queensland but certain varieties are outstandingly more popular than others. The Canadian Wonder is an all round favourite on the market, but owing to its susceptibility to disease is not grown to the same extent now as previously. Brown Beauty is very popular in North Coast districts where it is known as a hardy and prolific variety. Stayley's Surprise also is grown extensively and is usually planted two or three weeks earlier than Brown Beauty. Other varieties grown to a lesser extent are Feltham's Prolific and Burnley Selection, the latter being a new variety supposedly blight-resistant.

Plantings may be made at almost any time of the year, depending on local conditions in each district. On the North Coast on areas free from frost June and July are the two main months for planting. Other districts prefer spring or summer planting.

In some parts of the State in the past great difficulty has been experienced in raising a crop during the hot months due to the ravages of the bean fly, but experiments have shown that it is possible to obtain at least partial control of this pest by spraying. Information on this and other pests and diseases of beans can be obtained on application to the Under Secretary, Department of Agriculture and Stock, Brisbane.

In preparing land for general market garden crops, along with cultivation they generally require the free use of well-rotted stable or other manure, but in the case of beans the application of heavy dressings of such manures often results in the production of an over-abundance of foliage and poor setting of pods. Beans grow best in a well-cultivated soil and preferably one that has been manured for a preceding crop. Well drained, clayey loams yield the best result.

Fertilizers should be freely used. There are on the market several commercial complete fertilizers for beans sold by well-known and reputable firms which can be purchased with confidence. The customary dressing is 6 cwt. to 8 cwt. per acre. It should be applied in the bottom of the drills covered with about an inch of soil before planting the seed.

Planting is usually done by striking out drills about six inches deep, and after applying the fertilizer and lightly covering this with soil, dropping the seed by hand and again raking in a light covering of soil. During subsequent cultivation the drills will gradually fill up. The rows may be 2 feet 6 inches to 3 feet apart and the seeds spaced 6 inches to 8 inches in the rows. Thirty-five lb. of small and 52 lb. of large seed is sufficient to plant an acre.

Horse cultivation is usually carried out, but it is not advisable that this work should be commenced in the early morning or at any time when the plants are wet, as the spores of certain diseases are more easily carried under these conditions.

Weeds should be kept in check as they will seriously affect the growth of the crop.

The maximum output of beans can only be gained by picking thoroughly as they become fit, that is, when young and tender; otherwise they will begin to form seed, and the plants will cease to bear marketable beans.

BANANA RUST CONTROL.

Banana growers in the area in which rust usually occurs, particularly those on first cut plantations, will be well advised to look out for the first of the new season's rust, which already has been noticed in some localities. In order to ensure clean fruit at maturity it also would be advisable to commence bagging and dusting with a nicotine dust once a fortnight. Full particulars of control methods are available in pamphlet form from the Department of Agriculture and Stock.

In the earliest stages of rust damage, a black smudge will be noticed in between and where two fruits touch, the top hand usually being the one affected most. Numbers of thrips, which are responsible for the damage, will also be observed on the bunch.

Three very important things must be observed if growers expect good results from the control treatment.

1. The bag must be of good quality hessian with a very close weave, similar to that of a sugar bag. Chaff bags and bags with a similar mesh are too open in the weave for use where rust is bad. On the other hand, potato bags are too coarse and have a tendency to damage the fruit at the tips, through rubbing.

2. The bunch must be bagged as soon as possible after being thrown, preferably before the bracts are shed.

3. The first dusting particularly, and subsequent dustings, must be thorough.

In places where rust is only slight, good quality chaff bags will reduce the damage and otherwise improve the quality of the fruit, but if the damage is severe the good quality hessian bags, plus a fortnightly dusting for from 8 to 12 weeks, are essential.

To ensure treating the bunches as soon as possible after they are thrown, it is necessary to go through the plantation at least once a week to make the fortnightly dusting programme much easier if each week's baggings are distinctively marked. For instance, the bags which are placed in February should be marked with a "2" to denote the second month of the year. Underneath the "2" should be marked "1," "2," "3" or "4" to indicate in which week of the month the first dusting was given. When subsequent dustings are given the bunches marked "1" and "3" will be dusted one week and the bunches "2" and "4" in the following week. By marking the bags in this way with the month and week of bagging, the grower also will be greatly assisted in determining the approximate time when a bunch is ready to cut.

REPLACEMENT OF CITRUS TREES IN ESTABLISHED ORCHARDS.

Citrus growers who desire to replace unprofitable or decadent trees in established orchards should haul them out and remove all old roots from the soil.

Occasionally replaced trees do not make satisfactory growth. The poor development of the young trees, however, is usually due to faulty soil preparation. After removing and burning all the old roots the hole should be left open for some time before the new tree is planted. A few weeks before replanting, the soil should be thoroughly cultivated and levelled off. A generous dressing of rotten stable or farmyard manure or some other well-decayed humus-forming material is then mixed with the soil. In frost-free areas, replanting may be done in autumn, but where the frost risk exists, July or August planting is preferable.

Before planting, the roots of the young tree should be trimmed and all broken ends cut off cleanly. The soil should be firmly tramped around the roots. The tree should be set at precisely the same height at which it was growing in the nursery—i.e., with the bud above soil level. After the tree has been set and the soil around it well tramped, but before the hole is completely filled, apply a bucket of water, and when this has soaked in the hole should be filled with loose soil without further trampling.

When the rooting system is established, apply $\frac{3}{4}$ lb. to 1 lb. of sulphate of ammonia to each tree. The fertilizer should be scattered in a circle from 9 inches to 18 inches from the base of the young tree and then raked or chipped into the soil.

LABELLING THE EXPORT APPLE CASE.

With fruit for export, close attention should be given to details in the general "get-up" of fruit labelling.

It is often found when inspecting fruit at the ship's side that labels have not been carefully pasted on the ends of the cases. If the labels have become detached or torn, there is no means of identifying the owner or the trade description of the contents of the case.

Care in applying the labels is therefore necessary. A good paste is made as follows:—

Take 1 lb. flour, $\frac{1}{2}$ oz. alum, and 1 pint water. Mix with a little cold water, then add boiling water until the paste thickens. If the resultant paste is too thin, it should be boiled slowly and a little more flour added with vigorous stirring until the consistency is right.

When applying the labels, they should first be soaked for a short time in clean water. The paste is then applied by using a broad brush first to the case end and then to the label. The pasted surfaces are applied to each other, the label and the case being pressed into close contact by rubbing the surface of the label with a damp rag.

The following points should be observed:—

Place the label squarely on the end of the case.

Use rubber stamps for filling in particulars of varieties, &c. Pencil or writing of any description is not permitted.

Apply the rubber stamp squarely in the spaces on the label.

It must not be forgotten that Queensland's overseas consignments compete with the world's best fruit on the United Kingdom and European markets. Quality fruit should not be handicapped by a faulty finish to the case.

REWORKING DRONE CITRUS TREES.

In orchards where undesirable types of citrus trees have been cut back for reworking, the final thinning of shoots not required for budding into may be done. Where necessary, the trunks and limbs should be re-whitewashed to continue protection from sunburn. In districts where the growth of new shoots is sufficiently advanced (they should have attained a diameter of some $\frac{3}{8}$ inch at the base), and providing that the sap is flowing freely, they may be budded.

When the shoots are ready to receive the bud, a perpendicular cut is made in the bark at or near the base. The cut should be from 1 to 1½ inches in length, and in depth through to the cambium layer. Another cut is then made horizontally across the top of the perpendicular one, so that the two together form a T.

Budwood should be taken only from selected trees which are healthy and vigorous and noted for consistent production of heavy crops of quality fruit. Budwood should be well rounded, mature wood about the thickness of an ordinary lead pencil or slightly less and not more than one year old. Before the buds are cut from the budstick, the leaves are trimmed off so that a piece of the leaf stalk or petiole is left in each case. By this means the bud can be more easily handled after cutting.

The bud may be cut off the stick either from above or below, but the general practice is to cut from below the bud upwards, commencing about half an inch below and ending about half an inch above. The cut must be made with a sharp, thin-bladed knife, and be just deep enough to remove a very thin layer of wood. In the absence of thorns, the wood may be carefully removed from behind the bud, care being taken not to damage the bud.

The bud is then inserted down and under the bark of the stock by raising the latter with the budding knife. In order to bring the bud and stock in close contact, they are bound tightly together with a raffia tie. In from two to three weeks the bud, if it remains green, will have taken—that is to say, united with the stock. The tie may then be cut and the head shortened back to force the sap into the bud. The stub may be utilised to support the shoot from the bud during its early growth, but when the shoot has made good growth and is strong enough to support itself the stub should be removed altogether.

LETTUCE GROWING.

Lettuce is one of the most popular vegetables, and with regular sowing, and care in cultivation it may be grown the whole year round. In Queensland, the best times for planting are the late summer, autumn, and winter.

Lettuce is a vegetable that must be grown quickly to ensure crisp leaves. If a check is received during growth the leaves acquire a slightly bitter taste, which tends to decrease the market value of the plants. This defect is more prevalent during the late spring, early summer, and autumn plantings.

The soil should be well cultivated, and it is desirable that, where possible, large quantities of well-rotted farmyard manure be incorporated with the soil. Should fresh manure be used some time should elapse before planting.

Lettuce may be grown in a seed-bed and transplanted into rows, allowing 12 inches between the plants. The seed may also be sown directly into the row and the plants later thinned out to the required distance.

Sow the seed thinly and cover lightly with fine soil, and then firm the ground gently.

During the growing period the soil around the plants must be kept cultivated, but care must be taken not to allow any soil to get on or into the hearts of the plants. Constant watering is essential and the soil should never be allowed to dry out. Should the plants appear to be growing slowly an application of liquid manure would be beneficial, or, failing this, a top-dressing of nitrate of soda or sulphate of ammonia at the rate of 1 to 2 cwt. per acre. These fertilizers should be spread lightly over the ground, but under no circumstances on the plants.

Lettuce should be marketed as soon as possible after cutting, as they deteriorate in quality very quickly.

The cabbage type of lettuce is the popular one in Queensland, and should be cut for market as soon as possible after hearting. For home use lettuce may be used earlier.

Popular varieties for planting are:—

New York or Neapolitan.—A very large variety, best suited for planting in the cooler months.

Iceberg.—A large, good-hearting variety, with crinkled leaves and pink tips, suitable for planting in warm weather.

A pamphlet on packing of lettuce for market is obtainable free on application to the Department of Agriculture and Stock.

The Fruit Market.

J. H. GREGORY, Instructor in Fruit Packing.

As these notes are being written, good rains are falling throughout Australia, breaking a prolonged dry spell. This should help to maintain sound trading conditions for an extended period.

Stone fruits are now nearing the end of their season. Because of the dry weather, brown rot has not been a source of heavy loss this season.

New season's apples are in good supply, and prices have been satisfactory.

Bananas have risen to payable prices, which should continue for some months to come.

The marketing of green pineapples on southern markets still gives cause for complaint, and should be discontinued. A scheme has been inaugurated for the supply of case lots direct to country homes, and is meeting with considerable success. There is no doubt that schemes of this kind can be of great assistance in relieving the market during periods of over-production.

TROPICAL FRUITS.

Bananas.

Sydney.—Cavendish: Sixes, 12s. to 15s.; sevens, 15s. to 17s.; eights and nines, 17s. to 19s.

Melbourne.—Cavendish: Sixes, 12s. to 14s.; sevens, 14s. to 16s.; eights and nines, 16s. to 18s.

Pineapples.

Brisbane.—Smooth leaf, 2s. 6d. to 5s. per case; Ripley, 3s. to 6s. case; Loose—Smooth leaf, 1s. to 3s. per dozen; Ripley, 6d. to 2s. 6d. dozen.

Sydney.—Smooth leaf, 6s. to 8s. per case.

Melbourne.—Smooth leaf, 7s. to 9s. per case.

Papaws.

Brisbane.—Yarwun, 9s. to 11s. bushel half; Locals, 2s. to 5s. bushel. Few special to 6s.

Sydney.—10s. to 18s. tropical case.

Melbourne.—16s. to 18s. Specials higher.

Mangoes.

Brisbane.—The mango season is now finished. Prices have been very satisfactory for good fruit throughout the season.

Avocados.

Brisbane.—Small lines of this fruit have appeared on the market. The warning about sending immature fruit to the market applies just the same to avocados as to other fruits.

CITRUS FRUITS.

Oranges.

Brisbane.—American navel oranges have been appearing on the Brisbane market. "Sunkist" brand, the quality is good, and sold at 32s. to 34s. per export case. New South Wales Valencias, 12s. to 17s. bushel.

Grapefruit.

Brisbane.—Palestine grapefruit, 26s. to 29s. per export case (1⅓ bushels).

Lemons.

Brisbane.—Gayndah, 16s. to 22s.; Locals, 8s. to 15s.; Benyenda, 20s. to 24s.; Victorian, 17s. to 20s.; Queensland, 20s. to 26s.

DECIDUOUS FRUITS.

Apples.

Brisbane.—Cookers, 5s. to 7s.; Jonathan 8s. to 12s.; Granny Smith, 7s. to 10s.; Delicious, 7s. to 13s. Many lines of Granny Smith are immature, as prices show.

Sydney.—Granny Smith, 7s. to 9s.; McIntosh Red, 6s. to 8s.; Jonathan, 8s. to 11s.; Delicious, 8s. to 12s.

Pears.

Brisbane.—Victorian W.B.C., 9s. to 12s.; Gansell's Bergomot, 6s. to 11s.; N.S.W. W.B.C., 10s. to 13s.; Beaure Cap, 7s. to 11s.; Packham's Triumph, 8s. to 12s.

Peaches.

Brisbane.—Stanthorpe, 5s. to 6s. half-bushel.

Nectarines.

Brisbane.—4s. to 7s. half-bushel.

Plums.

Brisbane.—Ponds, 6s. to 8s.; President, 6s. to 7s. 6d.; Grand Duke, 5s. to 7s.

Quinces.

Brisbane.—To 6s. per case.

OTHER FRUITS.

Grapes.

Brisbane.—Waltham Cross, 7s. to 9s.; Muscats, 5s. to 7s. 6d.

Tomatoes.

Brisbane.—Ripe, 2s. to 5s.; Green, 3s. to 5s.; Coloured, 4s. to 6s..
Sydney.—4s. to 7s. half-bushel.

Passion Fruit.

Brisbane.—8s. to 14s.

Sydney.—14s. to 20s.

MISCELLANEOUS, VEGETABLES, &c.

Carrots.—3d. to 1s. 3d. bundle.

Rockmelons.—3s. to 7s. dozen; 5s. to 6s. per case.

Cucumbers.—3s. to 5s. bushel case.

Pumpkins.—*Brisbane*—9s. to 14s. bag; *Sydney*—£12 to £16 per ton.

Marrows.—2s. to 6s. dozen.

Lettuce.—6d. to 2s. 6d. dozen.

Cabbages.—8s. to 18s. per bag; Specials to 22s.; Locals, 2s. 6d. to 14s. dozen.

Beans.—4s. to 6s. sugar bag.

Peas.—6s. to 11s. sugar bag.

Beetroot.—3d. to 1s. 6d. bundle.

[*Photo.: Lands Department.*

Plate 145.

A bridge under construction on an access road to a North Queensland jungle.

PRODUCTION RECORDING.

List of cows and heifers officially tested by Officers of the Department of Agriculture and Stock which have qualified for entry into the Advanced Register of the Herd Books of the Australian Illawarra Shorthorn Society, Jersey Cattle Society, and Ayrshire Cattle Society, production charts for which were compiled during the month of January, 1939 (273 days unless otherwise stated).

Name of Cow.	Owner.	Milk Production. Lb.	Butter Fat. Lb.	Sire.
	AUSTRALIAN ILLAWARRA SHORTHORNS.			
	Mature Cow (Standard 350 lb.)			
Burradale Daisy 15th	W. F. Kajewski, Glenroy, Glencoe	10,451·9	421·51	Lovely's Earl of Glenthorn
	Junior, 4 Years (Standard 310 Lb.).			
Kyabram Marie 2nd	A. H. E. Black, Kumbia	10,280·33	452·862	Springlands Brigadier
	Senior 3 Years (Standard 290 Lb.).			
Willow Farm May Queen 11th	A. H. E. Black, Kumbia	7,736·4	327·987	Willow Vale Hinkler
Navillus Daisy 4th	C. O'Sullivan, Navillus, Ascot, via Greenmount	7,541	298·889	Alfa Vale Re Nell
	Junior 3 Years (Standard 270 Lb.).			
Kyabram Betty	A. H. E. Black, Kumbia	9,755·68	480·25	Springlands Brigadier
Kyabram Marie 3rd	A. H. E. Black, Kumbia	9,611·7	434·111	Springlands Brigadier
	Senior 2 Years (Standard 250 Lb. .			
Folkestone Lemon	N. Bidstrup, Ehlma Warra	11,644·93	383·369	Glenore Monarch
	Junior 2 Years (Standard 280 Lb.).			
Alfa Vale Model 11th	W. H. Thompson, Alfa Vale Nanango	11,545·4	538·288	Reward of Fairfield
Jamberoo Glory 3rd	A. H. E. Black, Kumbia	7,011·72	274·839	Banker of Brooklyn Terrace
Laguna Handsome 2nd	F. G. Lamkin, Kainkillenbun	6 328·59	269·903	Morden Marcus
Alfa Vale Dandy 6th	F. G. Lamkin, Kainkillenbun	6,576·26	247·499	Reward of Fairfield
	JERSEY.			
	Mature Cow Standard 350 Lb.).			
Calton Cream Lass	J. L. Comiskey, Warra	7,853·58	481·219	Retford Meteor
Inverlaw Mariposa's Duchess	R. J. Crawford, Inverlaw	7,732·83	406·885	Yuruga Mariposa's Duke

JUNIOR 2 YEARS (STANDARD 230 LB.).

Glenview Rosalyn	F. P. Fowler and Sons, Coalstoun Lakes	5,999·6	337·07	Trinity Governors Hope
Grange Vale Music	T. R. Gillespie, Ravenshoe	5,414	322·325	Banyule Supremacy
Oxford Buttercup 12th	Farm Home for Boys, Westbrook	5,670·1	300·373	Oxford Peer
Lermont Sweetlips	J. Schull, Oakey	6,079·3	281·818	Woodside Golden Volunteer
Lermont Viola	J. Schull, Oakey	5,220·3	267·91	Woodside Golden Volunteer

AYRSHIRE.

SENIOR 3 YEARS (STANDARD 290 LB.).

Myola Ode 2nd	R. M. Anderson, Southbrook	8,425·4	341·364	Fairview Combination

General Notes

Staff Changes and Appointments.

Mr. E. R. Behne, Assistant Technologist, Bureau of Sugar Experiment Stations, has been appointed Chief Assistant Mill Technologist, Bureau of Sugar Experiment Stations.

Mr. H. Jarvis, Research Officer, and Mr. D. O. Atherton, Assistant Research Officer, Department of Agriculture and Stock, have been transferred from Toowoomba to Brisbane, and from Atherton to Toowoomba, respectively.

Mr. J. Shilkin, B.V.Sc., has been appointed Veterinary Surgeon (Milk Investigation), Department of Agriculture and Stock.

Mr. F. A. Manning has been appointed acting inspector of stock during the absence on leave of Mr. L. H. Roles, Clerk of Petty Sessions, Boonah.

Mr. R. J. C. Drew (Rochdale) has been appointed an honorary protector under the Fauna Protection Act.

Mr. N. C. E. Barr, Inspector of Stock, Slaughterhouses, and Dairies, has been transferred from Toowoomba to Jandowae.

Mr. R. P. M. Short, Chief Clerk of the Department of Agriculture and Stock, has been appointed Acting Under Secretary during the absence on sick leave of Mr. R. Wilson.

Mr. Short has also been appointed Deputy for Mr. Wilson as a member of the Rural Development Board for the period of the latter's absence.

Mr. H. S. Hunter, Senior Clerk (Marketing), has been temporarily appointed to the position of Acting Director of Marketing during Mr. Wilson's absence from office.

Mr. Bulcock's Records.

When Mr. Bulcock crosses the seas to study the cattle industry in Argentine and South Africa he will take with him two enviable records. He has been Minister for Agriculture longer than any predecessor; and the other day he was re-elected for the seventh time President of the Council of Agriculture and chairman of the executive committee.

No previous Minister in the department has held such a long period record. In appearance he is more like a student than a farmer, but agriculture runs in his blood. He was born on an irrigation farm in Victoria, and studied agriculture at the Wagga Agricultural Farm, getting a first-class general knowledge of agriculture and stock-breeding.

In 1919 he followed the late Mr. T. J. Ryan as member for Barcoo, becoming the youngest member at that time in the Queensland Parliament. Seven years ago he became Minister for Agriculture, and so far as I know he is so satisfied with the department in William street that he is not likely to ask for a change of portfolio—"Queenslander" in *The Courier-Mail.*

Mulgrave Local Cane Prices Board.

An Order in Council has been issued under "*The Regulation of Sugar Cane Prices Acts*, 1915 *to* 1938," constituting a local sugar cane prices board in respect of the Mulgrave Central mill and in respect of the lands of canegrowers set out in such Order in Council. The board shall consist of four members and a chairman.

Incubation of Eggs at Hatcheries.

The Regulations under the Diseases in Poultry Acts have been amended to provide that the owner of every registered hatchery shall comply at all times with the following conditions:—

> He shall not permit the incubation at such hatchery of any egg other than an egg produced thereat or at some other registered hatchery, or that is the product of poultry the owner of which has been issued with a certificate by the Department of Agriculture and Stock to the effect that such poultry have been blood tested, unless at such registered hatchery provision is made for hatching by the use of a separate incubator eggs not so produced.
>
> Further, he shall not allow any egg produced at his hatchery to be placed in any incubator except an incubator at a registered hatchery.

Road Accidents due to Carelessness.

Of the eighty-one motor accidents in Brisbane streets in the week ended 4th February at least forty-eight are ascribed by the police to preventable causes.

Issuing a recent weekly return the Commissioner of Police (Mr. Carroll) said that a deplorably large number of collisions could have been averted. Common among the causes of accidents were—

Failure to keep clear sight of the road.
Pulling out suddenly from the kerb.
Failure to take reasonable precautions.
Driving on wrong side.
Crossing intersections without due care.
Speeding.

Two straying cows, a scooter, and a steam roller helped to make up the total of 111 accidents. None was fatal, but twenty-nine persons were injured, three seriously.

Folly of Over-fattening Pigs.

Referring to reports received at his Department of the quality of meat exported to the United Kingdom from Queensland and other Australian States, the Hon. the Minister for Agriculture and Stock, Mr. F. W. Bulcock, remarked that to pig raisers it will be of special interest to note that in the Commerce Department, Chief Veterinary Officer's monthly report containing extracts from reports of the Veterinary Officer in London, special mention is made of the quality and condition of Australian frozen pork arriving on the London markets.

In the January, 1939, report the following references appear:—

> *Frozen Pork.*
>
> Over the past two years, Australian baconers have built up an increasingly good reputation with United Kingdom curers, but in recent weeks many complaints have been received from curers and agents regarding the number of overfat carcases shipped, more particularly from Queensland but also from Western Australia.
>
> One curer who anticipated, on previous experience, that a consignment he bought would produce 50 per cent. No. 1 and 50 per cent. No. 2 Selections stated that the results gave him the same proportion of No. 2's and No. 3's.
>
> Another leading curer reported obtaining only 53 first Selection out of a line of 600. Inquiries among agents, etc., show that complaints are widespread, and cannot be attributed wholly to the lower bacon prices ruling during the middle of the month. The position will be made the subject of a separate report, but it is urged that producers who customarily breed for the porker trade be advised not to fatten such carcases to the baconer class if such cannot be done without producing an over-fat carcase.
>
> In this regard, it is interesting to note that the general impression here is that home baconer production for next year will be encouraged by the lower world prices for feeding stuffs, and the possibilities are that bacon will be cheaper than for some time past.
>
> For the first quarter of 1939, the Board of Trade announces that the following quantities of frozen pork may be admitted from the countries named:—

United States of America	59,630
Argentina	32,948
Brazil	2,755

It will be seen from this report that there is no profitable demand on the overseas market for overfat pork or bacon pig carcases, and that the continuance of supply of such must inevitably result in the weakening of values and loss of reputation of Dominion pork products.

The report also indicates the necessity of stricter grading of all pork products and of payment entirely on a basis of grade.

Trans-Border Fruit and Vegetable Trade.

The Assistant Minister for Agriculture and Stock (Hon. D. A. Gledson) referred recently to an announcement by his colleague, Mr. Bulcock, that he had communicated with the Minister for Agriculture in New South Wales protesting against the enforcement by that State of a new regulation which prohibited the transport of fruit and vegetables from Queensland over the Border, and which was operating with undue harshness in western border towns.

Mr. Gledson stated that a reply had now been received from the New South Wales Minister intimating that he had given the matter very careful consideration, and had since issued instructions that in future fruit and vegetables are to be permitted to cross the Border without inspection and without payment of inspection fees at Bonshaw, Texas, Smithfield, Keetah, Boggabilla, Goondiwindi, Bonanga, and Mungindi. The privilege, however, has been granted only on the distinct understanding that the fruit and vegetables are to be supplied solely for the consumption of local residents.

Banana Industry Ballot.

A Regulation has been issued under the Fruit Marketing Organisation Acts, empowering the Committee of Direction of Fruit Marketing to conduct a poll on the question of the issue of a direction relating to all bananas grown for market in the part of the State between the degree of latitude 25 degrees south (which runs just north of Maryborough) and the New South Wales border. Notice of intention to issue the direction has already been published by the Committee of Direction, and the regulation approved prescribes the conditions under which the poll shall be held, the ballot paper to be used, and other requirements.

Electric Shocks.

In cases of electric shock, the Director General of Health and Medical Services advises:—

(1) Do not go for the doctor. The patient may die while you are away. Let the next person who comes go for him.

(2) Switch off the current, taking hold of the switch with hands wrapped in several thicknesses of dry cloth.

(3) Do not touch the patient or the live wire with bare hands; e.g., use a folded coat with empty pockets.

(4) If you have long-handled shears, insulate them with several thicknesses of dry cloth, and cut the wire.

(5) If you have rubber gloves, snatch the patient from the wire by a single quick movement, not letting his body or the wire touch your feet.

(6) If none of these things are available, move the patient away from the live wire with a dry wooden stick, if possible with one movement only. A dry loop of garden hose may be used to drag the patient clear.

(7) Immediately he is released, commence artificial respiration and on no account should this wait until the doctor has arrived. The best method is the Schaefer, or Prone Pressure method, done twelve times a minute, not more. Remember to keep cool and keep counting.

(8) Artificial respiration should be continued until the body begins to stiffen, which commences in about five hours.

Cases have been known to recover after artificial respiration for three hours and more.

Cases where artificial respiration was only carried out for half an hour or so might in many instances have recovered if continued for an adequate period. No patient should be believed dead, in spite of anyone's opinion, until death-stiffening begins.

Wild Life Preservation.

An Order in Council has been issued under "*The Fauna Protection Act of 1937*," declaring the timber reserves at Paluma and Mount Spec to be a sanctuary under and for the purposes of such Act.

An Order in Council has been issued under "*The Fauna Protection Act of 1937*" declaring an area embracing Upper Numinbah and Springbrook to be a sanctuary under and for the purposes of such Act.

Answers to Correspondents

BOTANY.

Replies selected from the outgoing mail of the Assistant Government Botanist, Mr. W. D. Francis.

Chicory. Paterson's Curse. Blanket Leaf.

S.C. (Warwick)—

1. The very much branched twiggy plant is chicory *Cichorum Intybus.* Chicory has become naturalised in many parts of Australia, and is somewhat of a pest in the southern parts of New South Wales and in Victoria and South Australia. It has been established in Queensland for many years, and is moderately abundant on the Darling Downs. It does not seem to have spread here to the extent as it has done in the Southern States. When chicory runs wild it loses the large tap-root for which it is mostly cultivated in Europe as an adulterant of coffee.
2. The plant with blue flowers is *Echium plantagineum,* Paterson's curse or blue weed. This plant is a very serious pest in the wheat areas of New South Wales, Victoria, and South Australia. In the last State it is most generally known as ''Salvation Jane.'' It has been established in Queensland for a number of years, but does not seem to have spread here to the same extent as in the Southern States.
3. The third specimen is the blanket leaf, *Verbascum Blattaria.* We have received this specimen at odd times, but so far as we know it has never established itself as a serious weed. We would like to know if it is spreading in your locality, and later on to receive specimens with more advanced flowers.

A Paspalum. Para Grass. Grandiflora.

T.G.G. (Ayr)—

1. *Paspalum orbiculare,* one of the paspalum grasses, but decidedly inferior to the cultivated *Paspalum dilatatum.*
2. *Brachiaria mutica* (?), Para grass, better known in Queensland, perhaps, as giant couch or *Panicum muticum.* If this grass is correctly determined, it is a very palatable and nutritious grass which is an important constituent of the sown pastures of North Queensland, where it has received considerable publicity of late because of its use as a fattening grass. It has been successfully grown in South Queensland, particularly in small areas, for periodical cutting or feeding off. It does well under cultivated conditions, but prefers a rather moist climate, and in dry areas is confined to the edges of creeks and billabongs. It is very frost-tender.
3. *Brachiaria ramosa* var. *grandiflora.* This is an occasional constituent of the native pastures and has a fair reputation as a fodder grass.

Creeping Knapweed.

A.H. (Laidley)—

Your specimen is the Creeping Knapweed, *Centaurea repens,* a native of the east Mediterranean regions which has been established in Queensland for some time. In recent years, it seems to have been very much on the increase, but this is the first time we remember receiving it from outside the Darling Downs.

It is certainly a very serious weed pest, and difficult to get rid of. Frequent cutting to prevent seed formation, and, more especially, to starve the underground stems by depriving them of the food-obtaining green leaves, is the best method of eradication. Where practicable, this is best done by repeatedly cutting it off below the surface of the ground. Where that is not practicable, arsenic pentoxide might me sprayed on it, but it would probably have to be done several times. Ploughing probably only helps to spread the plant, because every underground portion cut with the plough or spade is capable of forming a new growth. In eradication the best thing to do is to try to prevent the formation of green leaves as much as possible, until the underground parts are starved.

Report on Sections of Stems of Trees from Barcarolle, Longreach.

F.L.B. (Gracemere, Rockhampton)—

> The specimens of sections of trees from Barcarolle are very valuable additions to our museum collections. An attempt at estimating the age of the sections has been made. It is quite evident from the results set out hereunder that finality is not claimed by any means. We would like to have some particulars about the sections mentioned in the report—especially as to whether they were from living trees—and the year and the time of the year the trees were felled.

1. Cross-section of Mulga tree (*Acacia aneura*) without bark, No. 137, Barcarolle, Jundah, via Longreach. The tree appears to have been dead for some time when the section was cut. The section appears to have been cut from the stem. It measures 18.7 cm. (7.3 inches) average diameter, and is excentric. Growth rings are prominent in the section except near the original centre. These growth rings appear to be very irregular. In places, wide rings are present. In other places, very fine rings are present. If the fine rings were counted, they would probably amount to more than 100. It is most improbable that each of these fine rings represents a year's growth. In other words, it appears to the writer as unlikely that these fine rings are annual rings. If there are annual rings in the stem, they are to be sought for on the basis of regularity and rhythm. In a few places, regular and rhythmic rings in small groups of two or three are found. Each of these regular rings measures approximately 2 mm. (1/12 inch in width). The radius of the woody cylinder of the tree is 9.35 cm. 3.6 inches). When this radius is divided by the width of the regular rings (2 mm. or 1/12th inch), the figure 47 is obtained. This figure represents the estimated age of the tree in years. It is quite likely that this method gives the minimum age of the tree, as the regular rings probably represent the growth of a normal season. We know on the other hand that many of the seasons are characterised by a shortage of rain, when growth would be suppressed.

The rings in the cross-section are composed of alternating bands of wood tissue. Usually a light-coloured band alternates with a dark-coloured band. The light-coloured band derives its colour from the fact that in it, vessels (pores) with their surrounding wood parenchyma (soft tissue) are very frequent. These vessels with their surrounding parenchyma are pale in colour. The dark band is made up principally of wood fibres which are dark-brown in colour. Vessels and their surrounding parenchyma are scattered in the dark band, but they are so few in number, that they do not impart their light colour to the band. Wood fibres are also present in the light band, but they are decidedly fewer in number than in the dark band. Occasionally a very fine pale ring is seen, which is composed mostly of wood parenchyma. The normal growth ring is composed of a light band and a dark band. The light band represents the spring or early summer wood. The dark band represents the late summer or autumn wood.

2. Cross-section of stem of Gidgee (*Acacia Cambagei*), No. 136, Barcarolle, Jundah, via Longreach. The average diameter of the woody cylinder of the section was cut. The section appears to have been cut from the stem. The woody cylinder has an average diameter of 24 cm. (9.4 inches). The rings are perhaps a little less prominent than in the Mulga section. There are very numerous fine rings almost throughout the section. These fine rings measure from less than .5 mm. to 1 mm. in breadth. It seems unlikely to the writer that each of these very fine rings is laid down in a single year. In other words, it is not considered probable that these fine rings are annual rings. In some parts of the section, there are wider rings, which on account of their regularity, present an appearance of rhythm associated with annual rings. These wider rings occur together in groups of two up to five rings. These wider rings are presumed to be annual. They average 2.35 mm. (about 1/11 inch). The radius of the woody cylinder, 12 cm. (4.7 inches), when divided by the average width of the presumed annual rings, gives the figure 51. Accordingly, 51 is the estimated age of the tree in years. As in the case of the section of the Mulga, this figure may represent the minimum estimated age of the tree. Presumably the rings which we measured as annual were laid down in a normal or good season. In dry seasons, the growth of wood tissue would be lessened. From this it would appear that the actual age of the tree may be considerably more than the figure given here.

The anatomical constitution of the growth rings in the Gidgee is essentially similar to that in the Mulga. See description in the report on the section of Mulga.

3. Section of Gidgee (*Acacia Cambagei*), No. 135, Barcarolle, Jundah, via Longreach. The woody cylinder of this section has an average diameter of 21 cm.

(8.2 inches). In many parts of the section there are fine rings varying from 1-2 mm. in width. In places there are series of regular rings of 2-3, which average 2 mm. (1/12 inch) in width. It is assumed that these regular rings occurring in series are annual. When the radius of the section, 10.5 cm. (4.1 inches) is divided by the average width of the assumed annual rings, the figure 52 is obtained. This figure represents the estimated age of the tree in years. For the reasons given in the previous reports, on the sections of Mulga and Gidgee, this figure is to be regarded as the minimum estimated age of the tree.

4. Section of stem of Budda (*Eremophila Mitchellii*), No. 139, Barcarolle, Jundah, via Longreach. The average diameter of the woody cylinder of the section measures 12.8 cm. (5 inches). The section appears to have been cut from a dead tree and a considerable portion of it had decayed. Numerous rings are evident in the section. The smaller rings measured .5 mm. in width. A few regular rings were found in series of two to four rings. These regular rings averaged 1.7 mm. in width. These regular rings may represent annual rings. When the radius of the section, 6.4 cm. (2.5 inches) is divided by the average width of the regular rings, the figure 38 is obtained. This figure represents the estimated age of the tree in years. As in the other sections, this figure is to be regarded as the minimum estimated age.

Section of Corkwood (*Erythrina vespertilio*), Barcarolle, Jundah, via Longreach, No. 138. Section apparently cut through stem. Woody cylinder measures 16.9 cm. (6¾ inches) average diameter. A characteristic of this species is its thick, corky bark from which it derives its common name, Corkwood. The bark in this section measured 5 cm. (2 inches) in thickness. At first sight growth rings are not apparent in this section. But upon closer examination, a number of widely spaced rings are faintly visible. These rings average 5.5 mm. (nearly ¼ inch) in width. These rings are fairly regular and rhythmical, and have the appearance of annual rings. The radius of the woody cylinder, 8.4 cm. (3⅜ inches), when divided by the average width of the presumed annual rings, gives the figure 15. This would represent the minimum estimated age of the tree in years. As the rings are so indistinct, it is quite possible that some of the intervening rings were missed. The estimated age is therefore very questionable.

The growth rings are so faint in this section that their anatomy could not be described accurately. One can assume, however, that the visibility of the rings, however faint, is conditioned by alternating zones of coarse and fine tissue.

"Native Sarsaparilla."

L.A.K. (Nanango)—

The specimen is *Hardenbergia monophylla*, sometimes called native sarsaparilla. It is a legume. The plant is a twiner with deep-blue or purple flowers. When in flower it is attractive in appearance.

Italian Millet.

S. (Townsville)—

The specimen is Italian millett (*Setaria italica*), an annual grass (both palatable and nutritious. As the plant is naturalised, it could be regarded as a weed in cultivation.

Twin Leaf or Gall Weed.

W.P. (Roma)—

The specimen is twin leaf or gall weed, *Zygophyllum apiculatum*. This species is fairly common in Western Queensland. Usually it is avoided by stock, which suggests that it is unpalatable. However, it is not known to be definitely poisonous.

Sword Bean.

S.G.W. (Mulgeldie)—

The specimen of the bean you send is from the sword bean, *Canavalia ensiformis*. This bean is regarded as edible in Java and other places. The young pods are used as a vegetable, and the seeds of the mature pods are removed and boiled in the same way as bean seeds. When in doubt, it is always as well to eat only a small quantity at first, to avoid any risk of poisoning. There are two varieties of this bean, the edible one has rose coloured or light red flowers, turning violet. The poisonous one has a white flower which turns pink and has a larger pod than the non-poisonous one. Your specimen, however, leaves little doubt that this particular pod is from the edible variety.

Rural Topics

Checking Erosion.

Last year almost a million acres of farm land in the United States were planted with an eye to protecting fields from soil erosion by strip-cropping, that is, planting with alternate strips of open-cultivated and close-growing crops. This method of nailing down soil is now being used in almost every State in the Union.

Strips of legumes or other close-growing crops between strips of corn, cotton, tobacco, and other open-cultivated crops on sloping fields slow down the run-off of surface water, filter out soil particles, and cause large quantities of water to soak into the soil. The most effective kind of strip-cropping has rows running round hillsides instead of straight up and down. Each horizontal furrow and harrow drag acts as a tiny dam to retard the run-off of rain water.

A Farmer's View of Taxation.

It is human nature to growl at every tax imposition, but here is a leading farmer's viewpoint expressed in the course of a recent talk on things in general:—"You know," he said, "we are all inclined to moan about the taxes we have to pay, but there is a good side to the tax question, when all is said and done. Under a democratic form of government like ours and in a country in which every man and woman has a vote, we could easily vote all taxes out of existence, provided we were fully united. But if we abolished taxation altogether, where would we be then? Taxes, after all, represent good roads, modern schools, soil and water conservation, reaforestation, electric power, police protection, the assistance of the Agricultural and other Government Departments, and a hundred other services. These things—all essentials in our civilisation—can't be had for nothing. Look what lack of modern facilities meant to the old people—loss of time, hard living, no schooling, bad roads and all sorts of inconveniences, the lack of which made life very difficult. The joke of it is that to-day commodities and services are charged to taxation to which everyone contributes, while in the old days those things were listed under the head of individual living expenses. So long as the money is spent on service to the community in general, I don't see what there is to whinge about."

How it is done in England.

A news item from England:—

"A farmer was convicted at Weymouth for so neglecting a ewe that she died from maggots. He was bound over for three years not to own, keep or tend cattle, sheep or pigs during that period. In his appeal against the conviction, the sentence was commuted to a fine of £25—the maximum penalty—together with a warning that if he again appeared before the court on a similar offence he ran a serious risk of being sent to prison."

Mechanisation of Farming.

The January tractor school for farmers, at the Queensland Agricultural College, showed an extraordinary interest of the young man on the land in the mechanical side of farming. The attendance at the school was remarkable for numbers and keenness. Tractors and other farm machinery of the latest types were provided for their instruction. There is no dobut about the popularity of these summer and winter schools for farmers at the College.

It is remarkable how far we have progressed in the use of mechanical aids in cultivation and harvesting in recent years.

There are, of course, many obvious limitations to the modernising of farm equipment. Some holdings are too small for the economical use of modern implements. Then there is the old bugbear of capital cost, from which very few of us are free. We have reached the stage, however, at which most farmers—on new country especially—have in mind the possibilities of mechanical power and equipment.

Machinery progress is typical of the present age, and the farmer of the future will, no doubt, become more and more dependent on engineering knowledge.

The Nutritional Value of Pasteurised Milk.

Through experiments conducted at three centres in the United Kingdom, it has been found there is no significant difference in the nutritive value of pasteurised and raw milk. This is what the committee of the Privy Council for the organisation and development of agricultural research has reported:—

"It is reassuring to know from impartial inquiry that the process of pasteurisation as an added safeguard against unpreventable sources of infection and post-milking contamination on the farm is unobjectionable from the nutritional point of view. At the same time, it must not be forgotten that careless handling of pasteurising plant may re-contaminate the milk. . . . . The ideal is to supply milk from healthy herds, and the freeing of other dairy herds from disease. That should be the primary policy of the clean milk campaign."

Milking to Music.

Professor Mackintosh of the Dairy Research Department at Reading University, England, has stated that "a pleasant atmosphere that brings contentment is always more conducive to milk production than noise and disturbance." An English dairy farmer who has tried it out says that " cows milked to music close their eyes dreamily, twitch their ears, and keep time with their tails. Their yield is always more generous when they are given selections from the radio or gramophone." Not a few farmers, it is reported, have lately installed loud speakers in their cowsheds, and their cows are given selections of music during milking time.

When you come to think of it, the basis of this notion is probably the old idea of the dairymaid who sang as she milked the cows.

Original Australian Research.

Some of the most interesting sessions of the Science Congress were those at which were revealed the results of exclusive Australian research. No other country has made greater progress in the study of electrical conditions in the higher atmosphere—researches of vital importance to all modern short-wave wireless communication.

Another bit of original Australian research described was the experimental work on the treatment of blue mould in tobacco. An account was given of the success achieved in the treating of the soil and roots of the tobacco plant with benzol, and it can be only a matter of time before the advantages of this treatment become known in every country where tobacco is grown.

Taken all in all, the Congress was an unqualified success. It stimulated fresh thought and created new and valuable friendships. And, more than anything else, it splendidly achieved the most important object of giving a stronger impulse and a more systematic direction to scientific inquiry and, in some measure, the beneficial application of its results.

Empire Marketing.

A proposal to extend the functions of the Empire Beef Council to include the orderly marketing of mutton and lamb in Great Britain is regarded as the first practical step towards giving effect to resolutions of the Empire Producers' Conference in Sydney last year. A bold scheme to link Empire agricultural markets and interests is now in prospect, and it is possible, if not probable, that the resolutions will be endorsed by the British authorities concerned. As the chief resolution of the conference affirmed the principle of commodity councils on the lines of the Empire Beef Council, it would appear that a definite move to apply the principle generally may soon be made. The whole outlook has changed since the conference last year, and the opinion now is that the international situation has strengthened the Sydney decisions.

It is believed that the establishment of commodity councils, as proposed, for our exportable primary products, will strengthen rather than prejudice the position of the producers in the several exporting countries of the Empire. Through such councils they will be able to place their views before the British Government should that Government deem it necessary to regulate imports of primary products other than meat.

To Check a Bad Habit in Calves.

Skim milk-fed calves are often seen sucking each other after the buckets have been emptied. This bad habit should be stopped. Septic conditions, malformed teats, distorted udders, and early lactation in heifers may be traced to the habit of calf sucking calf. Either keep the calves away from one another by leg-roping until the taste of milk has dissipated, or feed them with meal—e.g., crushed or ground grain, pollard, bran, &c.—immediately after they have finished the milk.

Farm Notes

APRIL.

SUMMER fallowed wheat lands will now be in good condition, and can be maintained in good tilth by a light surface working after all rains in excess of 30 points, or sufficient to cake the surface soil.

Seed wheat can be prepared and held ready for immediate sowing by grading, and treating with an approved bunticidal dust for the prevention of boll smut.

Copper carbonate or the mercury dusts Agrosan and Ceresan will be found effective for this purpose, using from 1 to 2 oz. per bushel, according to the efficiency of the mixing apparatus utilised.

Seed barley and oats should be treated with a mercury dust, or with formalin in preference to copper carbonate.

The main sowings of winter cereals and legumes required for winter and spring feed will be made during the month; and growers are advised to include field peas or tares at the rate of 20 lb. seed per acre, thereby increasing the nutritive value of the fodder secured. Algerian oats predominate in present sowings, but the barleys, Cape and Skinless, in addition to the slower maturing varieties of wheat are also of value.

April and May are favoured months for the sowing of lucerne, the area under which valuable crop should be extended whenever possible. By sowing when weed growth is at a minimum, the young plants have a better chance to become thoroughly established, and there is less likelihood of the surface soil drying out and affecting germination, than if early summer sowings are made.

From 10 to 12 lb. seed per acre is ample on the best lucerne lands, but where sown largely for grazing purposes in the drier districts 3 to 4 lb. per acre will be found sufficient.

Root crops sown during March will be making fair growth, and should be thinned out to permit of full development. Further sowings of mangolds, swede turnips, sugar beet, field carrots, kahl rabi, and rape may be made where soil moisture is favourable. With the drier conditions anticipated, maize harvesting will become general in the southern districts, as once the cobs are mature, it is preferable to harvest and store away from weathering influences and weevils, which are often prevalent in the field at this season.

Full particulars regarding the fumigation of maize with carbon bisulphide can be obtained from the Department of Agrictulture and Stock, Brisbane.

Sorghums, together with other summer fodder crops, which are approaching maturity, and are not required for green fodder, should be conserved as silage wherever possible, as it is certainly better to have too much fodder rather than too many livestock.

Pumpkins required for storage should be allowed to ripen in the field, gathering with the short stalk attached, and storing in a dry airy shed, preferably on slatted shelves to permit of rapid inspection for possible decay.

Winter grasses and clovers may be sown during April in districts suitable for their growth, but such sowings must be made on thoroughly prepared cultivation.

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We have received a number of Order Forms for this Journal from which the names of the senders have been omitted. Until the senders supply their names the Journel cannot, of course, be despatched.

Orchard Notes

APRIL.

FOR overseas or interstate markets only perfect fruit should be selected, and it should be graded for size, colour, and quality, and properly packed, only one grade of fruit being packed in a case.

All orchards, vineyards, and plantations not thoroughly clean should receive early attention, for from now until the next rainy season the ground must be kept in a thorough state of tilth and free from weeds in order, firstly, to retain moisture in the soil; and, secondly, to enable birds, ants, and predacious insects to get at and destroy the pupæ of fruit flies and other pests harbouring in the soil.

Banana and pineapple plantations should be put into good order, and kept free from weed growth.

Land to be planted with trees should be prepared now, and it is always advisable to allow newly-cleared land time to sweeten before planting.

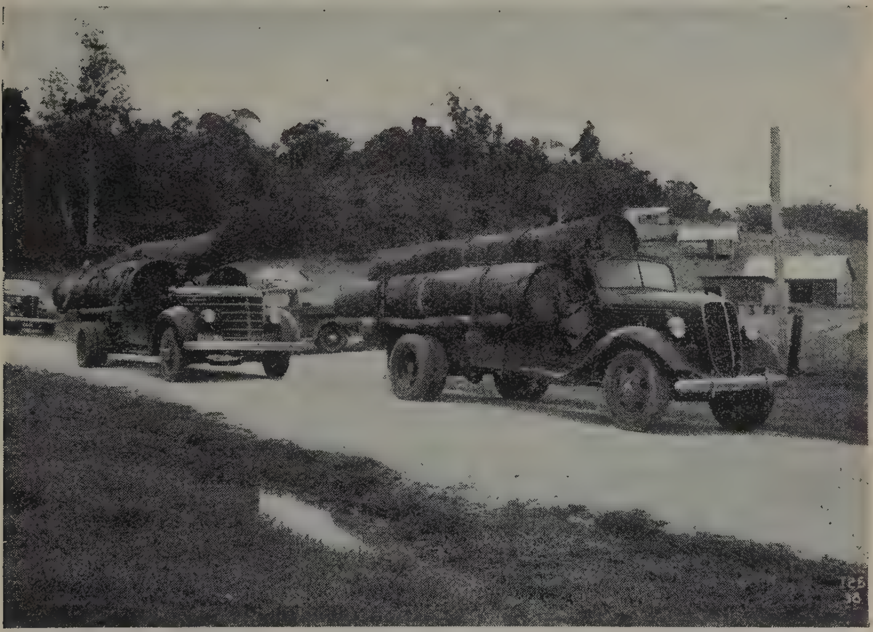

Plate 146.

Wealth in Wood.—Logs from the Rain Forest at Danbulla, North Queensland.

THE HOME and THE GARDEN

Our Babies.

Under this heading a series of short articles, by the Medical and Nursing Staffs of the Queensland Baby Clinics, dealing with the care and general welfare of babies has been planned in the hope of maintaining their health, increasing their happiness, and decreasing the number of avoidable deaths.

REST AND SLEEP

THE new-born baby normally sleeps nine-tenths of its time, and at six months two-thirds of its time. Baby should be trained to sleep at the same time every day and all night. The habit of sleeping peacefully is one of the clearest evidences of sound health. Normal healthy babies should be trained from the beginning to have no night feeding. This ensures an undisturbed night's rest to the mother, and establishes baby in his proper rhythm from the start, saving him from the period of irritability, disturbed rest, and slackening of growth incidental to the breaking of a bad habit a few months later. Why break in on the night's rest? Why impart any tendency to insomnia at the start of life? Happy is the baby who sleeps all night from the dawn of existence.

It is well to continue the morning rest until the child is three or four years old, especially during summer, when children wake early. Even if the child does not sleep, the habit of resting is of great value. A short rest or sleep restores a child wonderfully, and the result is that there is no crossness or fatigue at the end of the day.

In forming good habits of rest and sleep, regularity is necessary. Do not pick baby up when he cries at night. However, the mother should make sure that baby is dry, that he is snug and comfortable. It is possible to change baby's napkin without waking him.

The baby should be trained as soon as possible to sleep during the hours when the mother is busiest with her household duties, he will take a long sleep during the morning. As baby grows older he should not be encouraged to have a long sleep in the late afternoon as he will then not be ready to go to sleep after the evening meal at 5.30-6 p.m. A late afternoon sleep also interferes with the early afternoon outing. It would be a great advantage to the entire household, apart from the health and benefit accruing to the child, if young mothers would contrive to have the baby and younger children asleep in bed before the father arrives home for the evening meal. Never play with and excite a baby just before bedtime. While natural mothering and moderate handling is beneficial, injudicious or excessive handling or stimulation is highly injurious.

Over Strained Babies Sleep Badly.

Children are fond of babies and never tire of stimulating their funny performances. This should not be permitted. Unfortunately, some parents and friends are just as foolish in amusing themselves at the expense of the baby. A little gentle stimulation by the mother may be harmless and even beneficial to some babies. Continual stimulation especially before bedtime spoils their sleep, upsets their nutrition, and makes them nervous and irritable. This is giving them a very bad start in life, and may produce a state of restlessness, irritability, and bad temper which may be a serious handicap.

Some parents are in the habit of taking their children, and even their babies out with them in the evening shopping or visiting. In some instances there is no one with whom they can be left, but baby's welfare should always be considered first. It is worse still to take them to the cinemas, where they become over-tired or over-excited, and are exposed to great risks of infection with colds, influenza, and other diseases which may have serious consequences in a young child.

COCKROACH CONTROL.

Cockroaches are nocturnal, hiding during the day in dark corners and crevices, where they congregate in large numbers. In the house, they usually hide near the sink and drainboard, behind the kitchen cabinet, and in similar places. If disturbed when foraging at night, they run rapidly for shelter, and a knowledge of where they conceal themselves is usually the key to their control.

In Queensland, houses are constantly being reinfested by adults crawling and flying in from outside, and no control measures can keep a building continuously free from the pest, if reinfestation is possible. Therefore it is first necessary to clean up all outbuildings and burn accumulated rubbish of any kind. All cockroaches found hiding in packages of food and merchandise being brought into the house should be destroyed. They may be killed mechanically or by spraying with a proprietary fly spray. Crack fillers, such as putty or plaster of paris, can be used effectively to close many openings used by cockroaches as avenues of escape to hiding places. This is particularly important if cockroaches are coming in from adjacent apartments, through wall spaces, or along the plumbing fittings.

Sodium fluoride is the best cockroach remedy for use in homes which have already become infested. If the powder is not readily available in pure form, suitable commercial preparations, generally known as insect powders, containing up to 80 per cent. sodium fluoride, can be obtained from any grocer. Sodium fluoride is poisonous to man if taken internally in sufficient amounts, and it should be kept out of food and away from children and pets. If used with reasonable care in cockroach control, however, no harm will follow. It may be sprinkled by hand along the back of shelving, draining boards, and other places frequented by the pests. When so placed in the run ways the powder adheres to the limbs and is subsequently taken in through the mouth as the insect cleans itself. Sodium fluoride therefore acts as a stomach poison. The powder remains effective indefinitely in dry situations, but in very damp places it may cake and become useless.

Sodium fluoride is best applied with a small duster or bellows and blown into the hiding places. In this way more cockroaches are directly affected, for they die rapidly when the powder is blown directly on them. The application should be made in the evening and the powder left for two or three days. Frequent treatments are usually necessary at intervals of one or two weeks if the pest is to be kept under control.

—*D. O. Atherton.*

A BLAZE OF COLOUR.

[*Following are extracts from an interesting and suggestive article by* REDVERS J. BLATT *in the Summer Number of ''South African Gardening.''* The author describes the effect of colour in street beautification in many of the cities of the world which he has visited. His mention of Cairo when the poinciana is in bloom will awaken memories of its charm in the minds of Journal readers who were in Egypt in the course of the war years. The extension of the cult of colour in Queensland cities and towns would be well worth while. The coloured plate on the cover of the Journal for December suggests the possibilities of poinciana regia as a subject for street tree planting. Other tropical and sub-tropical countries provide excellent examples of colourful street avenues. Much has been done, but much more could be done towards building ''the city beautiful.'' Cairns, Townsville, Mackay, Rockhampton, Maryborough, and Toowoomba have all given a good lead. Grafton (New South Wales), like Pretoria, has its ''jacaranda time,'' and the fame of its annual festival has spread far and wide. In Brisbane there is plenty of scope for the planting of more flowering trees in every suburb. The southern cities, especially Melbourne and Canberra, are fully awake to the possibilities of this form of expression of civic pride. In Perth, scarlet avenues of flowering gums are living memorials to the men of vision who planted them. Inland towns like Bathurst, Bendigo, and Ballarat have a tree sense fully developed.*

Apart from the beauty aspect, a blaze of colour in the streets of cities and towns has a tourist value which, in frank phrase, would be sheer stupidity to ignore.—ED.].

GARDEN-LOVERS the world over strive to get as much colour in their gardens as possible, and, in general, they have the advantage in this respect in tropical and semi-tropical countries.

Pretoria is rightly becoming famous for its jacaranda trees, and a special festival is contemplated in future during jacaranda week. Pretoria is well worth a visit during jacaranda time, because from the Union Buildings a remarkable view is obtained of Pretoria's tree-lined streets, which give the appearance of mauve-bordered avenues.

The mauve of jacaranda flowers seems to blend well with the different shades of bougainvilleas, poinsettia, and hibiscus, and many gardens in Pretoria can truly be said to present a blaze of colour. Bauhinias bloom earlier than the jacaranda, otherwise they could add to the riot of colour.

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*''S. A. G.'' for Dec.-Jan.-Feb., 1938-39 (Wynberg, Cape, South Africa).

Many claim that the Pretoria jacarandas present the finest floral sight in the world, and while it must be admitted that the jacarandas take a lot of beating, there are some wonderful floral sights in different parts of the world that merit consideration.

Poinciana.—I happened to be in Cairo when the poinciana was in bloom, and was immediately captivated by this beautiful street tree. The tree-lined streets presented a blaze of red, and I came to the conclusion that comparisons are odious and that the streets of red are as beautiful as the streets of mauve. Pretoria in jacaranda time was no more beautiful than Cairo when the poinciana was in bloom.

Then picture the incomparable Rio de Janeiro—the city of dreams—in its magnificent setting, with its yellow flowering acacias—the predominant street tree in Rio—and one is presented with a sight fit for the gods. The yellow inflorescence of flowers of the acacia—resembling a wisteria very much—might not be so vivid as the mauve of the jacaranda or the red of the poinciana, but nevertheless presents an unforgettable sight.

The beautiful avenue of stately royal palms in Rio de Janeiro, while lacking colour, enhance the beauty of this enchanting city.

Old World Gardens.—No one can have the faintest conception of colour if he has not seen the flowering trees just mentioned, and yet there are many other places in the world where colour plays a predominant part. In the bulb country, around Leyden, in Holland, the landscape resembles a patch-work quilt during the flowering season. Kew Gardens and Hampton Court in spring will long live in my memory as a riot of colour, with the tulips and rhododendrons outstanding.

Gardeners in Florida, U.S.A., make great use of azaleas, bougainvilleas, poinsettias, and hibiscus to improve the colour scheme of their gardens, and obtain wonderful effects in this way.

Flowering Trees in the South Sea Islands.—However, in my humble opinion, the finest blaze of colour I have ever seen was in Papeete, Tahiti—one of the most beautiful of the South Sea Islands, if not the most beautiful. I was almost spellbound when I saw the blaze of colour—made up of many different coloured flowers of hibiscus, flamboyants (among the most beautiful of street trees), jacarandas, bauhinias, poinsettias, and bougainvilleas. The magnificent flowers of the hibiscus alone would place this scene among the most colourful anywhere, but when you add the flamboyant and jacaranda, you have a combination hard to beat.

Roses.—The famous Tournament of Roses held at Pasadena every New Year's Day gives one an idea of the magnificent effects which can be created by means of roses. It is doubtful whether more beautiful floats—unique in their beauty and originality—can be seen anywhere in the world. This is one of the premier attractions in California—a State that has so much to show—and apart from the aesthetic value has put Pasadena on the map, and is of tremendous publicity value to the city.

CIVIC PAGEANTRY IN FLOWERS.

All over the world we find an increasing tendency to beautify parks, streets, and traffic circles, and the rock gardens at the Empire Exhibition in Johannesburg were so admired that something similar is to be established in the Kloof, near Killarney, as a permanent attraction.

In America much use is made of "civic centres," where the uniformity of architecture and public gardens add a pleasing touch to the city.

The Lilac.—Since 1892 Rochester, New York State, has developed, through purchase and exchange, the largest collection of lilacs in the world—over 1,000 shrubs, representing 384 species. Who would have thought there were so many different species? At the height of their beauty every year, a week is set apart by the city to celebrate the lilac festival, a fete which draws nearly 100,000 visitors from all over the country.

The Iris.—What Rochester has done for the lilac, Nashville, Tennesee, has done for the iris. Nashville has become the "iris city," and every May, when the city is ablaze with colour, an iris festival is held, during which thousands of visitors see, at no charge, lovely blooms that have won for Nashville hybridizers more prizes from English and American isis societies than have gone to any other city in the world.

In one park in Nashville you can see 20 acres of iris, and some iris parkways are 2 and 3 miles long—and one will be 12 miles long when finished. At the city airport is the largest single planting of iris in the world—a mile long and 15 feet wide.

Tulip Festival.—In Holland, Michigan, U.S.A., the annual tulip festival in May attracts half-a-million visitors. Four million brilliant tulips greet them in public and private gardens, and along every approach to the city. Here is a city—far removed from Holland in Europe, yet putting up a festival that would do the Hollanders credit.

Dogwood.—Greenfield Hill, in Connecticut, U.S.A., is a town with scarcely 100 inhabitants—well off the main road and hard to find—yet every week-end during the late spring the roads from all directions carry capacity traffic to see its glory of pink and white dogwood blossoms. The blaze of colour had its beginning in the dozen trees planted by Dr. Isaac Brousen. Since 1895 the Village Improvement Society has increased the number of trees, until to-day there are more than a thousand.

The California Poppy.—The California poppy—the national flower of California—is known almost all over the world, but to be fully appreciated must be seen in its native habitat, where huge splashes of yellow can be seen all over the fields, affording a blaze of colour not easily forgotten.

The Texas Bluebell.—The Texas bluebell—a lupin—is to Texas what the California poppy is to California, the fields being splashed with blue instead of yellow, as in California. No wonder the Texans have adopted the Texas bluebell as their national flower, because fields of this flower truly make a unique sight. Although lupins grow almost all over the world, it is only in Texas where one gets the massed effect.

IN THE FARM KITCHEN.

ICES AND ICED PUDDINGS.

The use of domestic refrigerators is extending rapidly in country districts, and so the following suggestions may be put to the freezing test before the warm weather ends:—

Rich custard is the basis of nearly all ices, and the following is an excellent mixture which can be flavoured with coffee, chocolate, strawberry, raspberry, pineapple, passion fruit, or any other fruit or fruit syrup. Milk can be substituted for the cream, but the ice will not be as smooth and rich, although it will be sufficiently good to use in a fruit sundae or melba.

Vanilla Ice Cream.

Take ½ pint milk, ½ pint cream, 3 oz. sugar, 2 egg-yolks, 1 egg-white, vanilla essence.

Heat the milk and sugar in a saucepan, and when almost boiling pour it over the well-whipped egg-yolks and allow it to cool. Flavour rather strongly with vanilla, slightly whip the cream, and add it to the mixture and freeze. If milk is substituted for cream, 1 oz. of cornflour should be used mixed to a smooth paste with a little of the milk, and then cooked (stirring all the time) in the remainder of the milk before it is added to the eggs.

A Fruit Melba.

Place a tablespoonful of the ice cream at the bottom of a champagne glass, then place on it half a pear or peach or whatever fruit is available; on this put a few teaspoonfuls of strawberry jam, and on this some stiffly-whipped cream. Top with a glace cherry.

Melon Ice.

Take 1 large honey-dew melon, 1 cupful sugar, 3 tablespoonfuls lemon juice, 2 cupfuls water, ⅛ teaspoonful salt, ¾ cupful dry sherry, ½ cupful whipped cream.

Cut melon, remove seeds, and scoop out pulp; place shell in refrigerator. Force pulp through a sieve and add lemon juice. Heat sugar and water to boiling point; add melon and salt, and when cold freeze until of mush-like consistency; add sherry and fold in whipped cream. Freeze until firm. Serve in melon shells and garnish with mint.

Lemon Water Ice.

Take 1 quart water, 2 cupfuls sugar, 1 tablespoonful grated lemon rind, ¾ cupful lemon juice.

Boil water and sugar for five minutes, add lemon rind and juice. Cool, strain, and freeze. Serve in chilled sherbet glasses. Serve with poultry or as a dessert.

A Fruit Sundae.

Put a tablespoonful of ice cream at the bottom of a champagne glass, pour over it two tablespoonfuls of any fruit syrup, cover with whipped cream, and over this sprinkle some chopped nuts.

Junket Ice Cream.

Take 1 junket tablet, 2 tablespoonfuls cold water, 3 cupfuls lukewarm milk, ¾ cupful sugar, ⅛ teaspoonful salt, 1 cupful thick cream, 2 teaspoonfuls vanilla essence.

Dissolve the junket tablet in cold water; add to milk, and mix well, add remaining ingredients. Let it stand in a warm place until slightly thick, then freeze in the usual way in the refrigerator or in the freezer.

Baked Alaska.

Take 1 thin sponge cake, 1 quart ice cream, 5 egg-whites, ¾ cupful sugar.

Place sponge-cake on several thicknesses of thick paper on a baking sheet. Cover cake with ice cream, allowing the cake to extend half an inch beyond edge of cream. Beat egg-whites until stiff, add half a cupful of sugar, gradually beating after each addition until sugar is dissolved. Spread over entire surface of ice cream and rim of cake and sprinkle surface with the remaining quarter-cupful of sugar. Bake in a hot oven for about five minutes or until lightly browned.

Iced Coffee Cream.

Take ½ oz. gelatine, ¾ pint milk, ¼ pint cream, 4 tablespoonfuls coffee extract, 2 oz. castor sugar, 6 drops vanilla essence, a little melted lemon jelly, angelica, glace cherries.

Soak the gelatine in a quarter of a pint of milk for half an hour and mix the coffee extract with another quarter-pint, which should be made hot, but not boiled. Mix the two together, then add the castor sugar and vanilla essence and stir over the fire till well dissolved; strain, add the cream and the rest of the milk. Rinse a mould in cold water, decorate it at the bottom with glace cherries and strips of angelica and set them with a little melted lemon jelly. Let it set quite firm, then pour in the cream carefully. Stand on ice or leave until next day before turning out.

Iced Pudding Deliceuse.

Take 3 eggs, 3 oz. castor sugar, ½ pint milk, ½ pint cream, ½ gill sherry, 2 oz. biscuit crumbs (lady fingers), dried cherries, vanilla essence.

Beat the eggs and castor sugar, boil the milk, and pour over them; return to the pan, and stir till it thickens, and when cool flavour with vanilla essence. Whip the cream, stir it in, together with the sherry and biscuit crumbs, freeze, but not quite so solid as for ices. Take an ice pudding mould with not too elaborate a pattern, as it will be difficult to press the frozen mixture into very small corners. Put some of the mixture into the bottom of the mould, then a layer of dried cherries or other fruits cut in small pieces, then more mixture and again more fruit in alternate layers until the mould is full. Press down with a wooden spoon, put on the lid, and place it in a pail surrounded with ice and salt. Leave until required. To turn out the pudding remove the lid from the mould; after wiping it dry turn it upside down on a glass dish, then hold a damp cloth round the mould for a few minutes. The pudding will then slip out in perfect shape. A little red fruit syrup should be poured round it in the dish.

American Iced Pudding.

Take 1 pint milk, 1 oz. sheet gelatine, 2 eggs, 1 oz. castor sugar.

Put the milk in a double saucepan with the gelatine. When dissolved add the well-beaten egg-yolks and stir until the consistency of thick cream. Beat egg-whites to a stiff froth with the castor sugar. Then add the hot custard, give one or two stirs, and pour into a well-wetted mould and stand on the ice for twelve hours. When turned out it should be a lovely sponge crowned with jelly.

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"SCOTLAND'S SALVATION"—BACK TO OATMEAL.

In Scotland there is a movement back to oatmeal porridge. It comes as a surprise to learn that such a movement is necessary, but there it is, and, as reported in the *Farmer and Stockbreeder* (England), we have the word of Dr. Allan Fraser, a well-known dietitian, for it. Porridge is dead, he says, replaced in the modern home by the breakfast cereal, but—since oats build strong bone, smooth skin, good teeth, and is the most important crop in Scotland—why not oatmeal porridge?—the coarse, nutritious oatmeal porridge Scotch people brought to Queensland, and which we all had to eat when we were kiddies. We have known hefty scrub-fallers to do a full morning's work on a soup plate of porridge sweetened with golden syrup to keep it sticking to their ribs.

To popularise oats, Dr. Fraser says he wants to tell the public the plain facts about their health-giving and strengthening qualities. Oatmeal might well prove Scotland's salvation, and possibly Australia's, too—especially in the light of the present physical fitness campaign.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JANUARY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING 1939 AND 1938, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Jan.	No. of years' records.	Jan., 1939.	Jan., 1938.
North Coast.	In.		In.	In.
Atherton	11·80	38	10·92	10·81
Cairns	16·55	57	26·25	15·77
Cardwell	17·02	67	19·94	25·94
Cooktown	14·34	63	13·10	9·75
Herberton	9·53	53	5·85	7·75
Ingham	15·96	47	8·80	34·51
Innisfail	20 20	58	26·32	29·12
Mossman Mill	17·84	26	24·98	20·96
Townsville	10·96	68	3·77	15·19
Central Coast.				
Ayr	10·95	52	2·88	12·82
Bowen	9·77	68	1·24	2 83
Charters Towers	5·41	57	2·01	5·69
Mackay P.O.	13·80	68	4·04	4·70
Mackay Sugar Experiment Station	13·57	42	5·07	5·17
Proserpine	15·28	36	6·09	6·89
St. Lawrence	9·11	68	5·39	0·91
South Coast.				
Biggenden	5·14	40	9·94	7·11
Bundaberg	8·57	56	8·97	9 73
Brisbane	6·39	87	1·93	7·70
Caboolture	7·53	52	4·20	11·17
Childers	7·27	44	6·55	7·48
Crohamhurst	12·21	46	4·24	19·95
Esk	5·70	52	3·01	8·21
South Coast—contd.	In.		In.	In.
Gatton College	4·24	40	6·56	4·11
Gayndah	4·57	68	5·13	4·30
Gympie	6·59	69	4·88	9·63
Kilkivan	5·43	60	6·73	3·79
Maryborough	7·04	68	8·73	8·44
Nambour	9·67	43	4·04	18·83
Nanango	4·61	57	4·35	6·89
Rockhampton	7·53	68	4·75	3·25
Woodford	7·76	52	2·75	13·74
Central Highlands.				
Clermont	5·06	68	4·96	2·47
Gindie	3·62	40	..	3·21
Springsure	4·16	70	6·82	3·01
Darling Downs.				
Dalby	3·33	69	7·97	4·69
Emu Vale	3 21	43	2·81	3·74
Hermitage	3·20	33	..	4·54
Jimbour	3·48	51	8·96	4·56
Miles	3·62	54	6·90	3·55
Stanthorpe	3·63	66	4·23	3 06
Toowoomba	5·06	67	6·73	9·40
Warwick	3·56	74	3·51	4·85
Maranoa.				
Bungeworgorai	2·01	25	..	4·90
Roma	3·08	65	5·19	4·47

A. S. RICHARDS, Divisional Meteorologist.

CLIMATOLOGICAL TABLE—JANUARY, 1939.

COMPILED FROM TELEGRAPHIC REPORTS.

Districts and Stations.	Atmospheric Pressure. Mean at 9 a.m.	Shade Temperature.						Rainfall.	
		Means.		Extremes.					
		Max.	Min.	Max.	Date.	Min.	Date.	Total.	Wet Days.
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	29·76	87	76	96	27, 28	74	10, 14 to 19, 23	1,310	17
Herberton	..	80	65	93	1	60	1, 2	585	17
Rockhampton	29·82	92	74	101	23	68	29	475	15
Brisbane	29·88	86	71	98	21	65	30	193	10
Darling Downs.									
Dalby	29·86	93	68	104	15, 16	60	29 to 31	782	13
Stanthorpe	..	87	61	102	15	54	4, 31	423	13
Toowoomba	..	87	64	102	15	53	8	673	11
Mid-Interior.									
Georgetown	29·75	94	73	105	1	69	30	581	9
Longreach	29·76	101	75	111	1	65	1	157	7
Mitchell	29 79	97	72	108	15	61	29	605	10
Western.									
Burketown	29·72	90	77	101	2	72	13	1,748	14
Boulia	29·68	103	79	113	1	70	5, 29 to 31	92	6
Thargomindah	29·72	104	78	114	15	68	28, 29	414	6

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

MOONRISE.

	March, 1939.		April. 1939.		Mar., 1939.	April. 1939.
	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					p.m.	p.m.
1	5·45	6·24	6·1	5·50	2·28	3 35
2	5·46	6·23	6·1	5·49	3·21	4·18
3	5·47	6·22	6·2	5·48	4·13	5·1
4	5·47	6·21	6·2	5·47	4·57	5 43
5	5·48	6·20	6·3	5·46	5·45	6·26
6	5·49	6·19	6 3	5·45	6·27	7·11
7	5·49	6·18	6 4	5 44	7·10	7 58
8	5·50	6·17	6·4	5 43	7·55	8·47
9	5·50	6·16	6·5	5·42	8·36	9·37
10	5·51	6·15	6·5	5·41	9·21	10·37
11	5·51	6·13	6 6	5 40	10·7	11·21
12	5·52	6·12	6 6	5 39	10·56	a.m.
13	5·52	6·11	6·7	5·38	11·45	12·11
14	5·53	6·10	6 7	5·37	. .	1·3
					a.m.	
15	5·53	6·9	6·8	5·36	12·37	1·55
16	5·54	6·8	6·8	5·35	1·29	2·46
17	5·54	6·7	6 9	5·34	2·20	3·40
18	5·55	6·6	6·10	5·33	3·12	4·32
19	5·55	6·4	6·10	5·32	4·3	5·28
20	5·56	6·3	6·11	5·31	4·55	6·23
21	5·56	6·2	6·11	5·30	5·46	7·22
22	5·57	6·1	6·12	5·28	6·41	8·22
23	5·57	6·0	6·12	5·27	7·36	9·17
24	5·58	5·59	6·13	5·27	8·31	10·17
25	5·58	5·58	6·13	5·26	9·29	11·11
						p.m.
26	5·59	5·57	6·14	5·25	10·27	12 1
27	5·59	5·56	6 14	5·24	11·26	12·49
					p.m.	
28	6·0	5·55	6·15	5·24	12·20	1·31
29	6·0	5·54	6·15	5·23	1·15	2·15
30	6·1	5·53	6·16	5·22	2·4	2·55
31	6·1	5.52			2·51	

Phases of the Moon, Occultations, &c.

6th Mar.	○	Full Moon	4 0 a.m.
13th ,,	☾	Last Quarter	7 37 a.m.
21st ,,	●	New Moon	11 49 p.m.
28th ,,	☽	First Quarter	10 16 p.m.

Perigee, 4th March, at 9.0 a.m.
Apogee, 17th March, at 1.0 a.m.

Half an hour after sunset on the 22nd, Mercury and the very finest crescent of the Moon, very near the western horizon, may not be visible to the unaided eye. Below the horizon, at 9 p.m., the Moon and planet will be separated by only 1 degree, Saturn will be higher up and set at 7.20 p.m. on that date.

The most important event for us is our Autumnal Equinox which will occur on 21st March. On this date (at 10 p.m. in Queensland) our planet Earth has reached a position in its orbit where each hemisphere receives the same amount of light, and as our globe rotates on its axis every 24 hours, each side being turned towards or away from the Sun alternately, day and night, are of equal length from Pole to Pole. The same is true of the Vernal Equinox, yet Spring is the time of sowing, and autumn of reaping, in spite of similar conditions.

Mercury rises at 6.13 a.m., 28 minutes after the Sun, and sets at 6.44 p.m., 20 minutes after it on the 1st; on the 15th it rises at 7.15 a.m., 1 hour 22 minutes after the Sun, and sets at 6.55 p.m., 46 minutes after it.

Venus rises at 2.22 a.m., 3 hours 23 minutes before the Sun, and sets at 3.51 p.m., 2 hours 23 minutes before it; on the 15th it rises at 2.40 a.m., 3 hours 13 minutes before the Sun and sets at 3.56 p.m., 3 hours 56 minutes before it.

Mars rises at 11.39 p.m. on the 1st, and sets at 1.20 p.m. on the 2nd; on the 15th it rises at 11.15 p.m., and sets at 1.3 p.m. on the 16th.

Jupiter rises at 6.3 a.m., and sets at 6.40 p.m. on the 1st; on the 15th it rises at 5.24 a.m., and sets at 5.54 p.m.

Saturn rises at 8.29 a.m., and sets at 8.16 p.m. on the 1st; on the 15th it rises at 7.42 a.m., and sets at 7.28 p.m.

Finally it is reported from Mount Wilson Observatory, U.S.A., that Jupiter has added two new satellites to its retinue of nine.

4th Apr.	○	Full Moon	2 18 p.m.
12th ,,	☾	Last Quarter	2 11 a.m.
20th ,,	●	New Moon	2 35 a.m.
27th ,,	☽	First Quarter	4 25 a.m.

Perigee, 1st April, at 9.0 p.m.
Apogee, 13th April, at 7.0 p.m.
Perigee, 28th April, at 8.0 p.m.

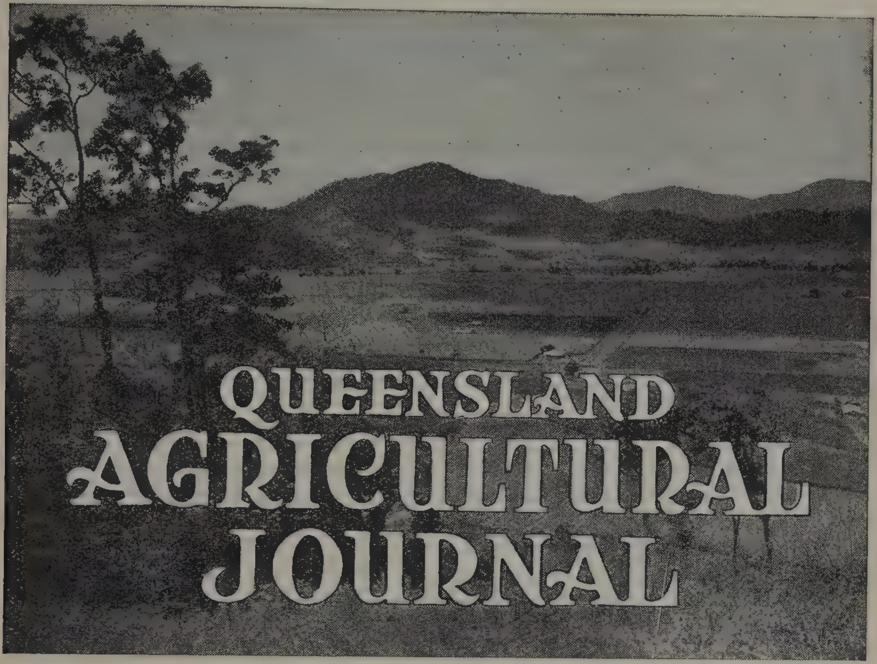
For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S. add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

ANNUAL RATES OF SUBSCRIPTION.—Farmers, Graziers, Horticulturists, and Schools of Arts, **One Shilling,** members of Agricultural Societies, **Five Shillings,** including postage. General Public, **Ten Shillings,** including postage.



QUEENSLAND AGRICULTURAL JOURNAL

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Event and Comment

Health and Agriculture.

BY raising the level of nutrition and increasing the consumption of foodstuffs it is believed that international trade can be greatly increased and, incidentally, agricultural production promoted. The association of health and agriculture would, if universal, soon put an end to policies of production restriction which have become an important factor—seriously adverse in its effects—in world economy.

As stated in the last report on nutrition from Geneva, "the malnutrition that exists in all countries is at once a challenge and an opportunity—a challenge to men's consciences, and an opportunity to eradicate a social evil by methods which will increase economic prosperity." Some Governments, notably those of Australia and Great Britain, have recognised this, and have formulated policies by which the primary producer, as well as the general community, must benefit considerably.

It has been urged that the solution of nutrition problems may even decide the fate of democracy. In a recent statement by the Queensland Branch of the British Medical Association, published under the imprimatur of the Queensland Nutrition Council, this possibility is stressed, and the Council has strongly urged the commercial world to review its activities in the light of this standpoint.

In the course of the statement referred to, it is pointed out that thirty years or more of medical research have revealed that health is quite as seriously menaced by improperly balanced or defective diets as it is by the bacteria of infectious disease. The danger of an ill-balanced diet is often greater, because the effects may not be noticed until serious damage has been done. Medical practitioners see much of this damage in the course of their daily work, and they feel that they should make it clear that even modern medical science cannot, in many cases, effect repairs. The situation is comparable with a building that has been constructed of insufficiently strong materials. That building, like the individual, is a liability instead of an asset.

As members of a democracy, they view with concern the rapidly growing cost of pensions and necessary sickness services, and their medical training and experience enable them to state definitely that much of this could be avoided by the application of the modern knowledge of nutrition.

A regrettable feature of the present nutrition situation in Queensland, the statement continues, is that foods such as milk, cheese, fruit, and vegetables, meat, and wholemeal cereals, are produced in excess of requirements. In fact, Australia produces more food per head of population than any country in the world except the Argentine. The situation is a challenge to our powers of organisation to make these foods available at a cost within the reach of the majority of the people. The provision of refrigerated fruit and vegetables for the dwellers in North-Western Queensland is regarded as an example of the type of development urgently required in this State. There is a danger that one may think this statement applies merely to others and not to himself, but it must be made clear that there is scarcely one of us who could not effect advantageously an improvement in the food habits of himself and his family.

The Nutrition Movement and the Man on the Land.

DISCUSSING the need of reform in the food habits of the people, the Queensland Nutrition Council quotes the final report of the Commonwealth Advisory Council on Nutrition, in the course of which it is stated that "there exists in Australia a considerable mass of minor departures from normal health describable generally as malnutrition. Some of this is undoubtedly economic in origin, some is due, also (in country districts), to inability to obtain adequate supplies of perishable foodstuffs; but a very large proportion is the result of faulty selection of diets arising through ignorance as to the proper balance of food items."

The Commonwealth Advisory Council on Nutrition was formed in 1936, following the recommendation of the League of Nations that there should be a world-wide inquiry into problems of nutrition.

The Commonwealth report showed that while Australians are on the whole better fed than other people, up to 33 per cent. of children examined were found to be in a state of malnutrition. In the family dietaries studied there was an almost universal deficiency of foundation foods, such as milk, eggs, cheese, fruit, and vegetables, coupled in many cases with too great a consumption of refined carbohydrate foods such as white flour and bread, biscuits, cakes, and sweets. As these deficiencies occur to a surprising extent in well-to-do as well as in poorer households, misguided selection of food appears as an important causative factor. This being so, there must exist in Australia a home market for primary products, undeveloped and hitherto unsuspected, which is dependent for its expansion chiefly upon efficient education of the public in relative food values.

''From a health point of view,'' the statement of the Queensland Nutrition Council continues, ''Australia has valuable natural resources which many other countries do not possess. But as a result of haphazard development and lack of constructive education, these resources have not been used to the best physical advantage of her people. And a more scientific development of Australia's food habits would be to the definite financial advantage of the producer. The nutrition movement is the best thing that ever happened to the man on the land. Even now, economic experts strive to preserve the London market for Australian butter, when the consumption of whole milk and cheese in this country is only half what is considered desirable, and when it is financially desirable for the dairy farmer to sell his milk as whole milk rather than as butter fat. Likewise, engineering experts have developed a refrigeration technique which enables fruit and other perishable foods to compete on overseas markets while fresh fruit and milk is largely unobtainable in many parts of Australia for lack of refrigerated transport and storage, even although the home market be frequently glutted.

''In these days of scientific progress it is indeed surprising to find modern man so loath to apply for his own physical benefit the results of scientific investigation. He will use science to improve his crops and his herds, while maintaining an air of tolerant indifference to scientific guidance concerning his own body and health. Good health can be obtained and maintained only in so far as human life is lived in accord with physiological laws, which apply to man and animal alike. If modern man were to apply to any of his domestic animals the dietetic principles to which he himself clings with such determination, he would not be long in realising the appalling results of his action. But however firmly the moving finger may trace words of wisdom and warning on the wall, he comforts himself that they do not apply to him or his children, and he refuses in consequence to modify his old habits. So it is a case of heads we win, tails we can't lose.

''If the people will but apply in their daily lives the modern knowledge of nutrition, they will not only realise a health standard that will make for a new level of national fitness, but they will benefit financially, first by reduced sickness and pension costs, and secondly by helping the primary producer, who is the backbone of the country.''

Queenslanders are Becoming Nutrition-conscious.

ACCORDING to the Nutrition Council, Queenslanders are becoming nutrition-conscious. The science that a few years ago was regarded as the prerogative of research workers is now finding its way into the average home and is playing an increasingly important part in our daily life. This development is not peculiar to Queensland. We are merely keeping in line with developments taking place all over the world. Science has shown us that an unbalanced diet is responsible for much of our ill-health, and every country is at present engaged in solving the problem of raising the nutritional standard of its people.

Sheep and Wool.

JAS. CAREW, Senior Instructor in Sheep and Wool.

NOT only is the sheep and wool industry important to those associated with it directly—whether it be on the production, transport, treatment, or manufacturing side—but also to the whole community. Some general notes on sheep and wool should, therefore, be of interest to those who, while not connected primarily with it, share indirectly in the fortunes of an industry which is the chief source of wealth to the State.

Plate 147.
(1) A sample of wool from the Camden flock. (2) Fine Merino wool.

Over 98 per cent. of the wool produced in Queensland is merino. A fact of great importance in the early pastoral history of Australia was that Macarthur, the founder of our woolgrowing industry, realised the value of fine wool and that the merino was the best breed for its production. Very little progress was made with Australia's first merino flocks, however, until the discovery of richer natural pastures further inland, when an immediate improvement in the constitution of the sheep was observed.

The sheep brought by pioneer squatters northward to the territory afterwards named Queensland were descendants of Macarthur's foundation merino flock. As settlement extended, men imbued with the pioneering spirit went further west and north-west, where they discovered immense tracts of open rolling downs country suitable for sheep raising and requiring practically no other improvement than the provision of permanent water. Since then, these areas have become the home of the merino in Queensland (Plate 149).

In the early days, the pioneer pastoralists travelled their flocks to where they had selected their holdings. Drovers who accompanied them remained to shepherd the flocks in the newly-settled country within reasonable distance of what was judged to be permanent water (Plate 150). Later, fences were erected, boundary riders were employed, and the day of the shepherd soon passed. Because of lack of lasting surface water, however, the advance of settlement was slow. The subsequent discovery of artesian water altered completely the conditions of occupation of the western pastoral lands. As the number of flowing bores increased, the water problem was progressively solved. Some of these bores gave a supply of over 1,000,000 gallons of water a day. By delving contour drains water was directed from the bore heads to different parts of the runs. Some of these bores have kept a flow going along 50 to 100 miles of drains for fifty years and more (Plate 151).

Plate 148.
Early Type of Merino Ram in Macarthur's Camden Park Flock.

The early settlers held leases over immense holdings (thousands of square miles) on which large flocks were run. Later, many holdings were subdivided. Many large holdings still remain, carrying flocks as large as 100,000 sheep.

STATION MANAGEMENT.

From a wool point of view shearing is the pastoralists' harvest, but a considerable amount of work and planning is necessary before his sheep can be shorn. Careful management is an essential factor in the maintenance of flock numbers and in the yield and quality of fleeces. On large holdings many people are employed, including station hands, boundary riders, cowboy, cook, head stockman, and overseer; while horses and well-trained sheep dogs are of importance in the general working of the flocks.

Plate 149.

SHEEP COUNTRY IN CENTRAL-WESTERN QUEENSLAND.—A contented mob of young rams in the shade of the Bauhinia—a beautiful native flowering tree.

Plate 150.

A River in Central Western Queensland.—On water frontages like this, pioneer settlers built their homesteads.

Plate 151.

AN ARTESIAN BORE AT NOONDOO, SOUTH-WESTERN QUEENSLAND.—This bore is 3,000 feet in depth and has a capacity of 580,000 gallons a day and has been flowing for forty years.

Plate 152.

LAMB MARKING ON A WESTERN QUEENSLAND STATION.—The lambs are held in a ''Shannon'' cradle, the invention of a Queensland pastoralist.

When a property—particularly a merino breeding station—is stocked with sheep to its normal carrying capacity, the selection of suitable paddocks is necessary for the different ages and sexes, each of which should have an adequate water supply. For breeding ewes, the paddock should be the best available with water within easy access at convenient distances and well shaded, especially with edible shrubs and trees. Careful attention at lambing time is necessary, and while the lambs are young the paddock should, as far as possible, be kept free from disturbing invasions of vermin—eagle hawks, foxes, and other predatory animals—and even from inexperienced or careless people, who may unknowingly cause confusion and separate ewes from lambs, leaving many lambs motherless.

While the lambs are still young, between three and six weeks old, they should be marked, which necessitates the mustering of all sheep in the paddock. On large holdings this is a big job, for which mustering camps are formed at suitable places where yards fitted with drafting race and catching pens have been erected. Most holdings have registered earmarks and brands, and as the lambs are being desexed and tail-docked, the station earmark is inserted—on the right ear of males and left ear of females (Plate 152).

In some districts dipping is necessary to protect the sheep against lice and ticks, while crutching and jetting is practised to minimise blowfly attack. In regions of light rainfall, scrub-cutting to supplement the pasture has often to be resorted to, while in districts of heavier rainfall drenching to control internal parasites should be done at regular intervals.

Fencing and buildings should be kept in repair, while the water supply calls for constant thought and attention.

SHEARING AND SHED MANAGEMENT.

Assuming that the shearing shed is fully equipped and the plant is in good order, much additional planning is necessary before shearing commences. Paddocks have to be mustered and the sheep held in readiness for delivery to the shed yards as required. Some of the sheep may have to travel 20 miles or more to the shearing shed and, perhaps, the same distance back to pasture after shearing. If thirty shearers are engaged (and many stations are still operating more than that number of stands), it means that they shear 4,000 or more sheep daily, which obviously necessitates a big movement of sheep to and from the shearing shed (Plate 153). In mustering sheep much depends on the knowledge of the overseer and the musterers. They should know the country intimately, observe weather conditions closely, have a thorough knowledge of the habits of sheep, and possess patience and endurance.

Sheep in sufficient numbers have to be kept up to the shearers, and this entails yarding, drafting, penning in a shelter shed, if necessary, then in the holding pens, and lastly into the catching pens in the shearing shed. Two shearers catch their sheep, from the one pen. An overseer, usually called the boss of the board, supervises the shearing and keeps tally of the number of sheep shorn by each shearer. Besides station hands, shearers, wool classers, and shed hands, there is another very important section—cooks and their assistants or offsiders (Plate 154). The position of shearers' cook requires a high degree of culinary and catering skill and sound domestic management. Dietetic variety, wholesomeness, and sufficiency to suit different tastes and satisfy

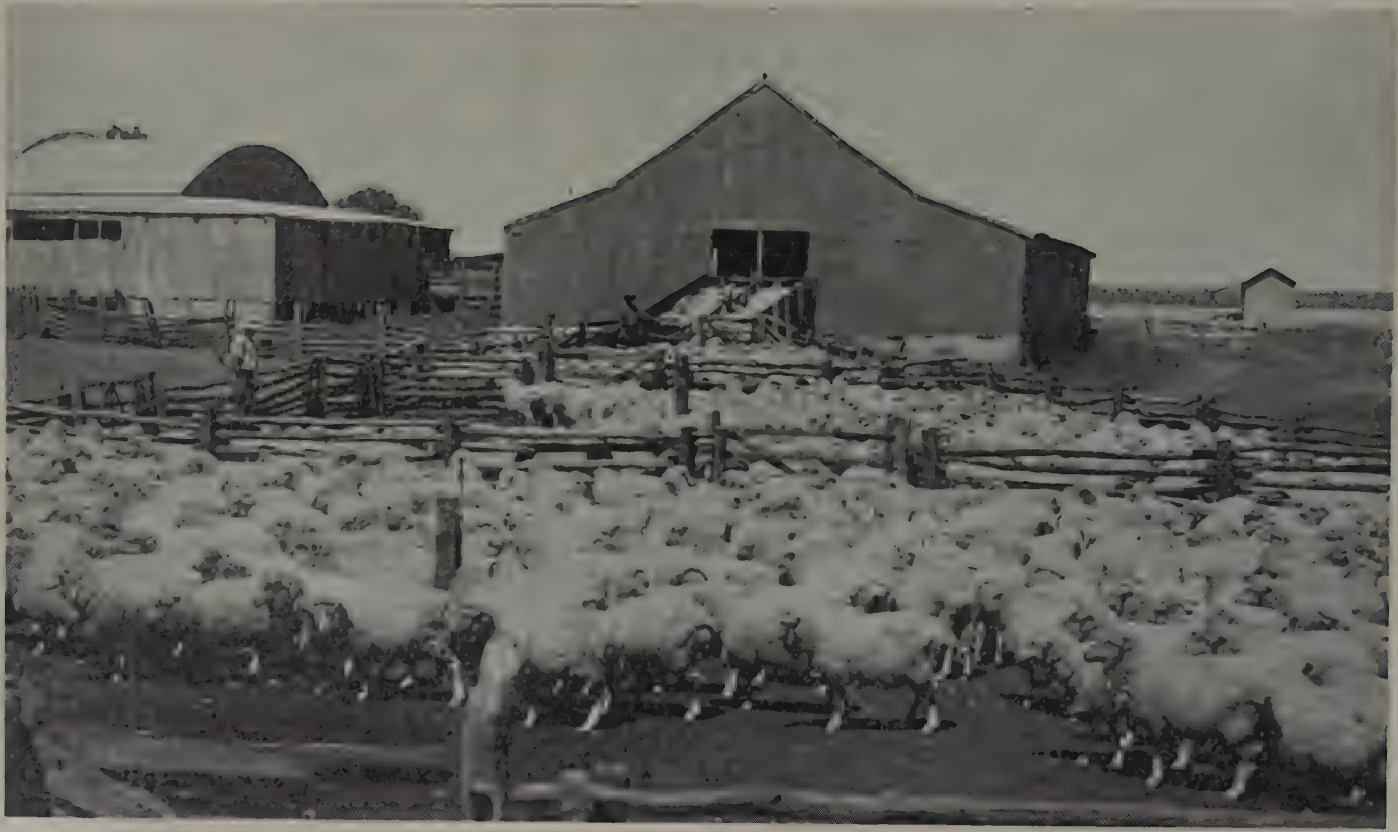

Plate 153.
Sheep yarded for shearing on a Central-Western Station.

hard-working men with the healthy appetites of trained athletes—competent shearing calls for physical fitness—are obviously matters for forethought and judgment.

Shearers work 8 hours each day, divided into 4 runs of two hours each. After the first and third run smoko is supplied to all hands at the shed. The chief meals of the day are partaken of at one of the three respective mess or dining rooms, one for the shearers, shed hands, and station employees, respectively. When shearing is about to commence at any period of the day the machinery is set in motion, the starting signal sounded and the shearers take their sheep from the catching pens and carry them on to the shearing board (Plate 155). When the sheep are shorn they are pushed down a chute or through an opening into a long counting out pen. The boss of the board usually counts out from each pen at the end of every run, when each shearer is credited with the number he has shorn. The shorn sheep are then branded and returned to their respective paddocks (Plate 156). All counts are recorded and each shearer is paid at the "cut out" of the shearing for the total number shorn. The present award rate for shearing is 38s. per 100 for flock sheep.

Besides the shearers, about an equal number of men are controlled by the wool classer and their work is to prepare the wool for market. The classer's team includes the pickers-up, skirters and rollers, piece pickers, belly pickers, wool pressers, bale weigher and brander, wool classer's assistant and the wool classer who has charge of this section.

As soon as each sheep is shorn, a picker-up gathers the fleece, using both hands and feet in a particular way to obtain the correct hold, and then carries it to the rolling table on which it is thrown out cut side down. His other duties are to sweep clean that portion of the shearing board assigned to him, pick up the belly wool which is shorn separately and place it in a basket kept for the purpose, and apply a dressing to any accidental cuts on the sheep, or as the shearer calls, "tar here."

Skirters and rollers skirt the fleece as it is thrown out on the table by removing all that portion around the edge which carries short wool, fatty ends, seedy, stained or faulty pieces, tar brands or dusty backs—all of which, when skirted, is thrown into baskets to be taken to the piece pickers' tables. The fleece is then rolled and carried to the classers' table for classification (Plate 157). All the wool removed in the skirting of the fleece has to be picked over by the piece pickers. They sort out each class, selecting the bigger and better portions as brokens, while the less attractive wool is classed into 1st, 2nd, and stained pieces, according to the condition of the fleece. Each class is placed in bins until a sufficient quantity for the pressers has accumulated.

When the belly wool is shorn from the fleece it is thrown aside by the shearer and placed in a basket by the picker-up and then taken to the belly picker for trimming as required. Belly wool is kept separate from all other wools, but the trimmings and stained portions may be placed with the stained pieces.

The wool classer classes the fleece wools himself. Besides supervising the men in his section he examines each fleece and appraises it for length, character, colour, yield, soundness, handling and spinning qualities. Fleece wools are usually classed into AAA, AA, A, A1, and A Flc. categories—each term being in accordance with distinctive characteristics of the station clip. The classer's chief aim is to have all fleeces in uniform grades and up to class standards.

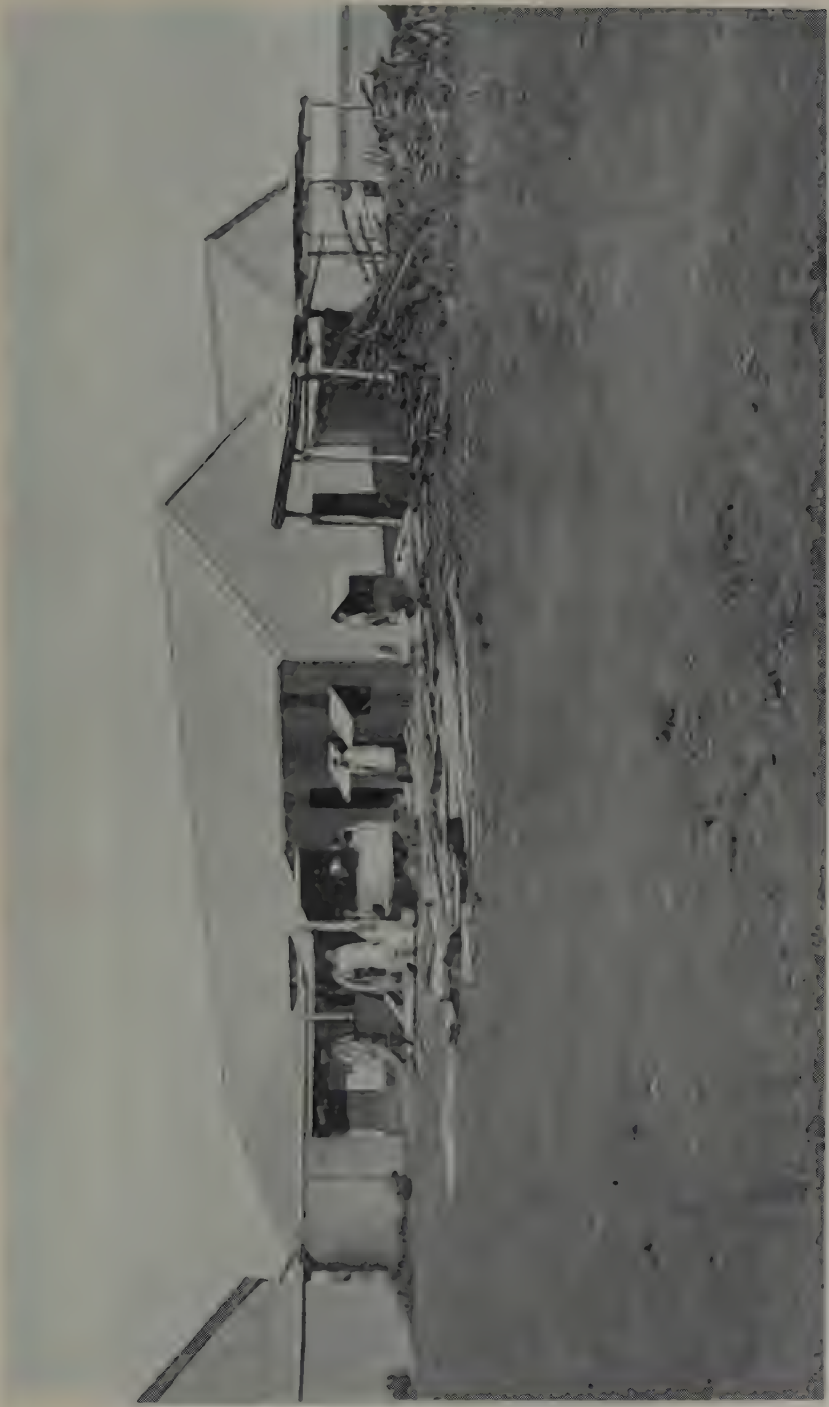

Plate 154.

The Cooks' Galley and Shearers' Mess Hut.

Plate 155.

ON THE SHEARING BOARD IN A WESTERN QUEENSLAND WOOLSHED.—Shearers are highly skilled workers, and display astonishing celerity with shearing machines, as their predecessors did with the blades in the not so long ago, when a tally of 100 sheep a day was regarded as a good performance. Fast workers usually exceeded that tally, and some remarkable records were established, such as, for instance, that of Jack Howe, who shore 336 sheep with blades in 9½ hours. This record was established at about the time when machines were beginning to come into favour, and many machine shearers have attempted to beat it. Since then, however, the size of sheep and weight and density of fleece have increased. Nevertheless, the average number of sheep shorn per man is much higher to-day than when blades were in general use.

Plate 156.
Branding shorn sheep.

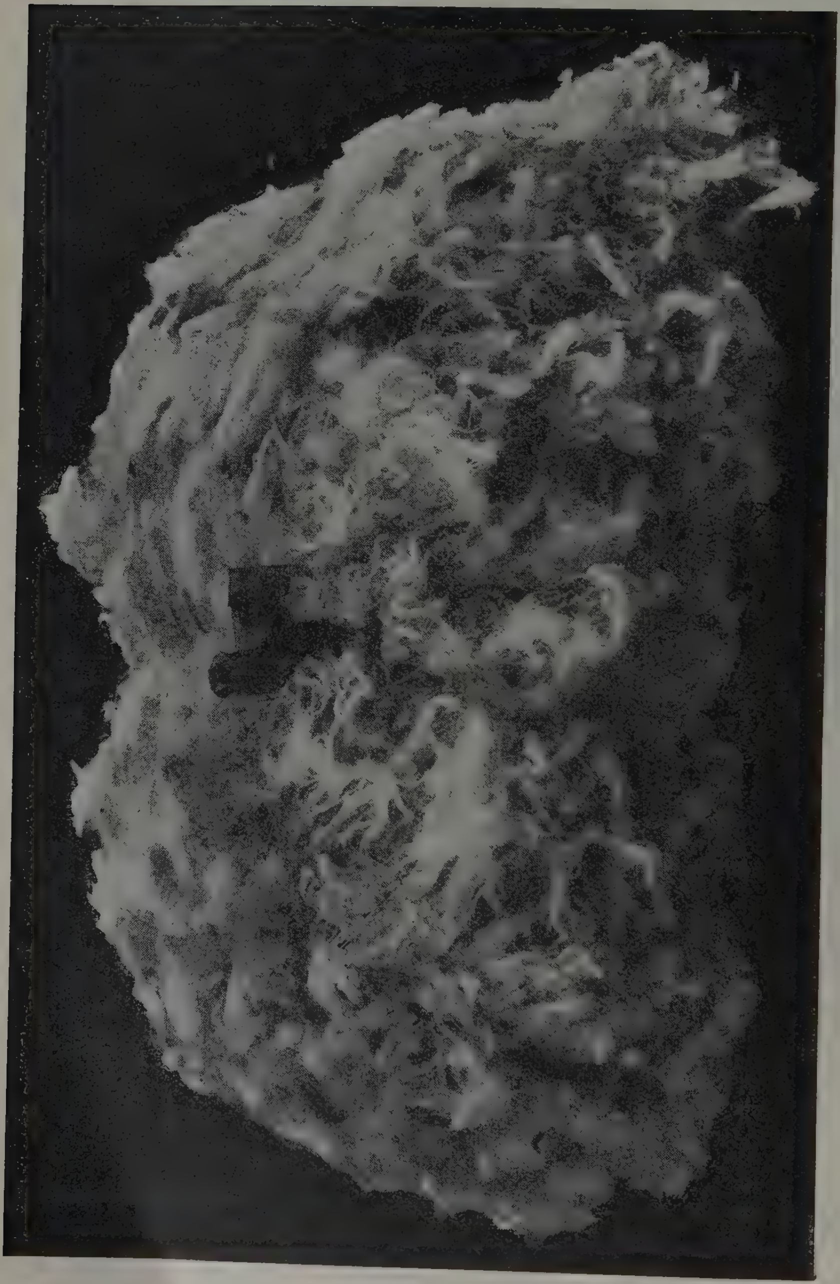

Plate 157.

Fleece rolled ready for classing.

All the tables over which the wool is worked are topped with batons or rollers spaced far enough apart to allow small bits of wool, second cuts, fatty ends and other loose locks to fall between them to the floor. These locks are classed in keeping with the wool which has been worked over the respective tables from which they have fallen. All bins are tabulated in keeping with the technical terms applied to the classes sorted.

Plate 158.
Wool pressing and branding the bales.

By the time shearing commences, the wool pressers will have put the press and operating gear in good working order. Wool presses of different makes are in use and each has its own particular type of working gear. Practically all have stationary bottom boxes and the top box fitted to swing or tip over for filling. The bundles of wool packs are then opened up and stacked in a convenient place near the press. A pack is placed and secured in the bottom box of the press; both bottom and top boxes are then filled with wool of a particular class. The top box is then swung into position over the bottom box and the bale is pressed by mechanical means to the size desired. The top box is then tipped up and the loose flaps of the bale drawn and secured with bale fasteners, after which the bale is turned out, chalk-marked according to class and left to the weigher and brander (Plate 158). Each bale of greasy wool should weigh not less than 200 lb. gross, but the weights are usually worked in keeping with the respective classes, good fleece wools under 300 lb. and locks about 500 lb. In branding a bale of wool the station brand, class, sex and numbers should appear on one side and the number on both the top and bottom of the bale, and the bale is then ready for despatch to market (Plate 159).

Plate 159.
Loading the bales for dispatch to market.

WOOL MARKETING.

The great bulk of the Queensland clip is auctioned by brokers. When a broker receives the wool, each bale is weighed by a sworn weigher, and recorded to the credit of the owner. A copy of the receival notice is forwarded to the secretary of the Wool Selling Brokers' Association for filing and cataloguing. When the quantity allotted for a sale is received, the closing date is decided and subsequent deliveries are entered up for the sale to follow.

Brisbane is the selling centre for Queensland. Wool sales are usually held in four days' series, about 50,000 bales being allotted for each series of which usually nine or ten are arranged in the course of the year. Two distinct catalogues are prepared for the sale of wool by auction, one the bulk catalogue which includes all lines having five bales or more, and the other or "star" catalogues having four bales or less. Other wools—fadges, butts and bags—not eligible for either of these catalogues also are received for sale. A fadge is an ill-shaped container not in keeping with the regulation size or measurement. If a properly shaped container or bale gives a gross weight of less than 200 lb. of greasy wool it is called a butt. Bags of various sizes are also received and are sold with the fadges and butts, but are disposed of more by barter and not auctioned.

When the brokers are preparing for a sale a specified proportion of the bulk lines are exposed for the inspection of prospective buyers for a few days prior to the sale. Here the valuers have the opportunity of obtaining the broker's calalogue, which contains all necessary particulars of all the wool listed for sale (Plate 160).

Wool sale week in Brisbane is a busy time for both brokers and buyers, each of whom is engaged in valuing. The broker must, in the interest of the owner, estimate approximate values before the sale. The order of sales during a series is decided by the brokers, and sales usually commence in Brisbane at 3 p.m. at the Wool Exchange.

The wool is offered in accordance with its lot number in the catalogue. Most of the wool sold in Brisbane is bought for export. All bales are dumped before shipment (Plate 161).

Wool included in the star lot catalogue is also sold by auction and the competition is generally well spread, the prices obtained are not as satisfactory to the growers as the prices for bulk lines. Scoured wools also are included in these two catalogues, but, generally, buyers and manufacturers prefer to purchase their wool in the grease.

MANUFACTURE.

The classing of wool for sale as practised in the shearing shed is quite different from classing in preparation for manufacture. In the station shed the fleece is classed as a whole, but for the purpose of manufacture each fleece must be divided or, as it is called, sorted into as many spinning qualities as it contains, and each sort matched with similar lengths and qualities—termed matchings—of other fleeces. As all the wool purchased by the manufacturers must be scoured and sorted it is more satisfactory to sort it beforehand as it can then be handled quicker and sorted with greater accuracy. Knowing the purpose for which the wool is required the station-classed fleeces are acceptable to the manufacturers whose choice is based on the particular spinning quality required.

Length and spinning quality of wool varies according to the breed of sheep producing it. The Lincoln, for instance, carries the longest and strongest wool of any of the British breeds, its wool varying in length up to 12 inches for twelve months' growth, and from 24^s to 36^s in spinning quality. The English Leicester also produces a long, lustrous wool up to 10 inches in length, and from 36^s to 44^s in spinning quality. The Border Leicester is another long wool breed, but its wool is shorter than the English Leicester and has a spinning quality of 44^s to 46^s. Its wool is also of a lustrous colour, a valuable advantage in dyeing. The Romney Marsh is another of the white-faced British long woolled

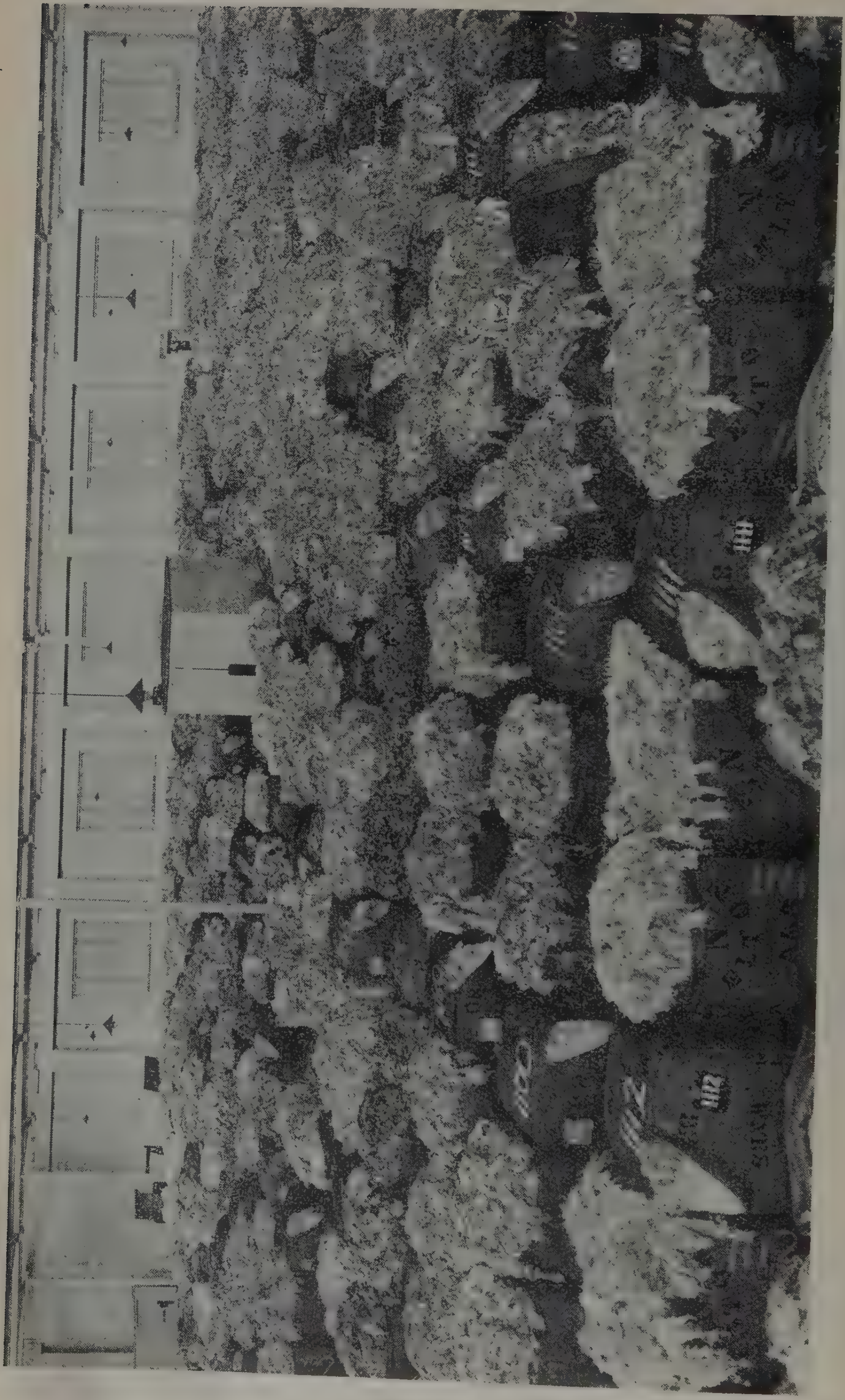

Plate 160.

A Wool Showroom Floor, Brisbane, Queensland.

breeds, but its wool is shorter than that of the Border Leicester and is of a duller or demi-lustre colour not so distinct in staple or character, and rather harsh and straight in comparison with that of other breeds when length of staple is considered. All of these breeds cross well with the merino, and their progeny produce a most useful type of wool, influenced to a considerable degree by the merino.

Among the Downs breeds are the Southdown, Dorset Horn, Shropshire, Suffolk—all of which produce a strong hosiery type of wool harsh in nature and short in growth. Their wool does not come into the

Plate 161.
Shipping dumped wool at the port of Brisbane.

combing class, being strong enough but too harsh and undefined, and it loses too much as noils in the combing process. Moreover, it is of a chalky white colour, and is carded and soft spun for knitting and similar purposes.

Merino produces the finest and best-quality wool of any of the breeds, and as over 98 per cent. of the wool sold in the Brisbane market is merino, its importance to Queensland is undeniable. There are three distinct grades of merino, however, and in spinning quality they vary from 60s to well over 80s in spinning counts. Merino wool is usually a bright white, but not of a lustrous colour; although a creamy white merino wool, when associated with soft "handling," is acceptable. The breed produces wool of a very high character, showing a characteristic crimp, not waves, as is found in the British long wools. Its outer surface in construction is scaly and these crimps and scales or serrations, as they are correctly called, give the wool its remarkable elasticity and softness. As the wool fibre carries innumerable minute cells, it renders its adaptability to absorb moisture a most valuable characteristic peculiar to the wool fibre only, while at the same time is retains its warmth when wet—a very valuable asset possessed by wool alone.

◆

SHEEP LAND FOR GRAZING HOMESTEAD SELECTION.

A resumption from Bierbank holding has been surveyed as portion 2, parish of Fairlie, and will be open for grazing homestead selection at the Land Office, Charleville, on Friday, 12th May, 1939.

The portion is situated about 24 miles south from Cheepie railway station, on the Quilpie railway.

The portion has an area of 38,667 acres, and the term of lease will be for twenty-eight years at an annual rental of 1¼d. per acre for the first seven years.

A condition will be that the selection must be stocked to its reasonable carrying capacity with the applicant's own sheep during the first three years.

The portion is watered by Beechal Creek, waterholes, and by an earth tank, and the country is described as gravelly mulga ridges with several nice flats along the creek frontages, and grassed with button, Mitchell, Flinders, mulga, blue, wire, kangaroo, and other useful grasses and herbage.

Free lithographs and full particulars may be obtained from the Lands Department, Brisbane, the Land Agent at Charleville, and the Queensland Government Tourist Bureaux at Sydney and Melbourne.

◆

SUNDAY MORNING—THE COUNTRYMAN'S SESSION.

Radio Service to Farmers.

Every Sunday morning at nine o'clock a bright, topical, and entertaining programme of information on rural subjects is broadcast from National and Regional Radio Stations. (By arrangement with the Australian Broadcasting Commission.)

Farmers are recommended to tune in to—
4QR (Brisbane), 4RK (Rockhampton), or 4QN (Townsville).

EVERY SUNDAY at 9 a.m.

Weather and market reports and a wide variety of farm topics.

Seeds Every Farmer Should Know.

F. B. COLEMAN, Officer in Charge, and R. J. HOLDSWORTH, Inspector, Seeds Fertilizers, Veterinary Medicines, Pest Destroyers, and Stock Foods Investigation Branch.

[*Continued from p. 622, Part 5, Vol. XLVIII.—November, 1937.*]

Part IV.

XANTHIUM PUNGENS (Noogoora Burr).

(Fig. 9.)

Common Name.—Noogoora Burr.

Description.—The seeds are enclosed in a tough elongated very spiny covering, the spines being up to 3 mm. long, and carrying a small hook at their extremities; at the end opposite to the point of attachment, will be found two—by comparison—very stout spines also carrying hooks. These hooks are usually lost when the seeds have been subjected to any rough handling.

The colour varies from light to dark brown and when weathered is very dark.

Size.—This varies, normal full sized specimens being 25 mm. x 12 mm.

Kernels.—Each burr contains two seeds or kernels of greyish appearance; these vary in size according to the burr from which they originate, the kernels in each burr being unequal in size.

As a rule one of the seeds germinates first and in the process lifts the burr still containing the other ungerminated seed above the soil. Provision is thus made for a fresh crop of Noogoora seedlings during the next suitable season.

Occurrence.—Commercially, Noogoora Burr is sometimes found as an impurity in chaff.

It has been found that the soaking of Noogoora burr seeds for 3 minutes in an arsenical sheep dip diluted 1 part to 200 parts of water (0·2 per cent arsenic) failed to prevent germination, but when the burr seeds were found in wool and this was soaked in the above solution and the burr and wool allowed to dry together over a lengthy period the seeds failed to grow.

The sale of material containing Noogoora burr is prohibited under the provisions of both the Seeds Act and Stock Foods Acts.

XANTHIUM SPINOSUM (Bathurst Burr).

(Fig. 10.)

Common Name.—Bathurst burr.

Description.—The seeds are enclosed in a tough hard very spiny covering. Spines are up to 2½ mm. long, and carry a small hook at their extremities. The two stout spines found on Noogoora burrs are absent in Bathurst burr. With a Bathurst burr the spines are readily rubbed off the seed covering.

Size.—This varies; normal full-sized specimens measuring 7 mm. x 5 mm.

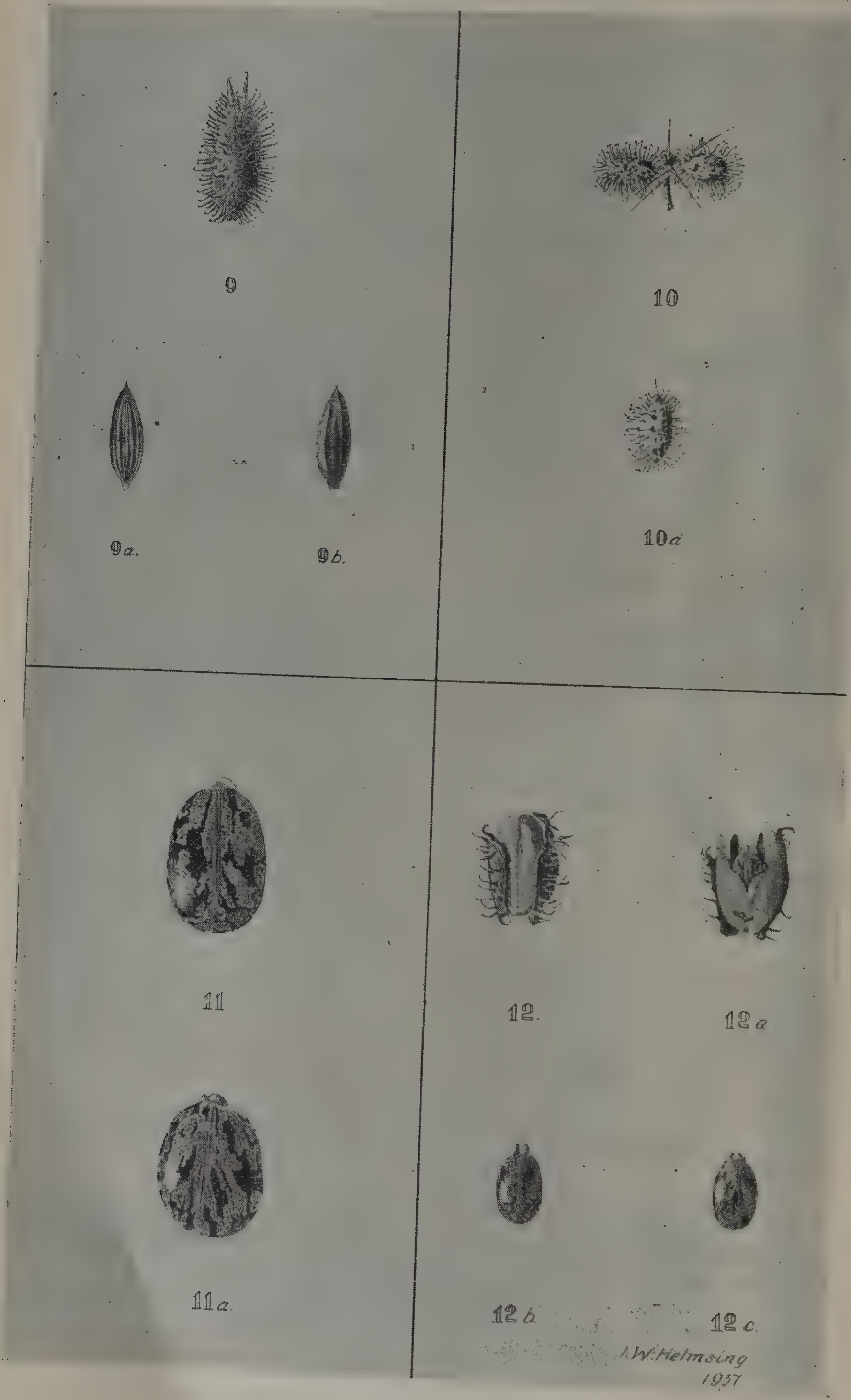
9
9a.
9b.
10
10a
11
11a.
12.
12a
12b
12c.
J.W. Helmsing
1937

Plate 162.

Kernels.—Each burr contains two seeds or kernels. These vary in size according to the burr containing same.

Occurrence.—Commercially, Bathurst burr is found in seeds of Japanese millet, Sudan grass, Setaria (Panicum), cowpeas, also in chaff.

These two burrs are a serious menace to the wool industry; a careful examination of the burrs will readily convince one of their ability to cling to the wool; as abovementioned, each spine, of which there are many per burr, is provided with a hook that makes a first-class instrument of attachment to the fleece—thereby ensuring their distribution over a wide area.

RICINUS COMMUNIS (Castor Oil Bean).

(Figs. 11 and 12.)

Common Name.—Castor oil bean.

Description.—The characteristic markings of these seeds once seen are easily remembered. The seed, with a distinct point of attachment at one end, gives the appearance of a beetle, which is heightened by the brown and white markings and flattened appearance. No two seeds are patterned exactly alike.

Size.—This varies greatly according to variety, but is commonly from 25 x 14 x 8 to 9 x 6 x 4 mm.

Occurrence.—This seed has not been recorded as occurring in crop seeds, but in the past has been found occasionally in hay or chaff.

Castor oil beans are found growing wild in Queensland, but in some parts of the world are cultivated for their oil content.

Unfortunately the beans of the castor oil plant are toxic, but poisoning is only likely to occur when the beans have by mischance been introduced into hay or chaff. It behoves any person who has these shiny leaved plants growing near hay crops to take such precautions as are necessary to prevent their accidental introduction into stock food.

The residue resulting from the extraction of oil must not be fed to animals; it is usually disposed of as a fertilizer.

Fatalities have sometimes been recorded in Europe from feeding other kinds of oil cake in which traces of castor oil cake have been found.

The castor oil of medicine is extracted from the castor oil beans, nevertheless as the beans are very poisonous they must not be eaten.

DESCRIPTION OF PLATE 162.

Fig. 9 Noogoora Burr—Xanthium pungens.
Fig. 9A Noogoora Burr—Seeds.
Fig. 9B Noogoora Burr — Seeds reverse side.
Fig. 10 Bathurst Burr—Xanthium spinosum, seeds and spines.
Fig. 10A Bathurst Burr—Xanthium spinosum, seeds and spines.
Fig. 11. Castor Oil Bean—Ricinus communis, medium seeded.
Fig. 11A Castor Oil Bean—Ricinus communis, medium seeded.
Fig. 12 Castor Oil Bean—Enclosed in outer coat.
Fig. 12A Castor Oil Bean—Outer coat partly removed.
Fig. 12B Castor Oil Bean—Seed.
Fig. 12C Castor Oil Bean—Seed reverse side.

All natural size.

Toxic Principle.—The toxic properties—according to Harold C. Long in "Plants Poisonous to Live Stock"—of the bean are due to Ricin, a toxin which is similar to bacterial toxins; activity is destroyed by heating at 100 deg. C. The beans also contain the alkaloid Ricinine, the toxic principles of which are regarded as doubtful.

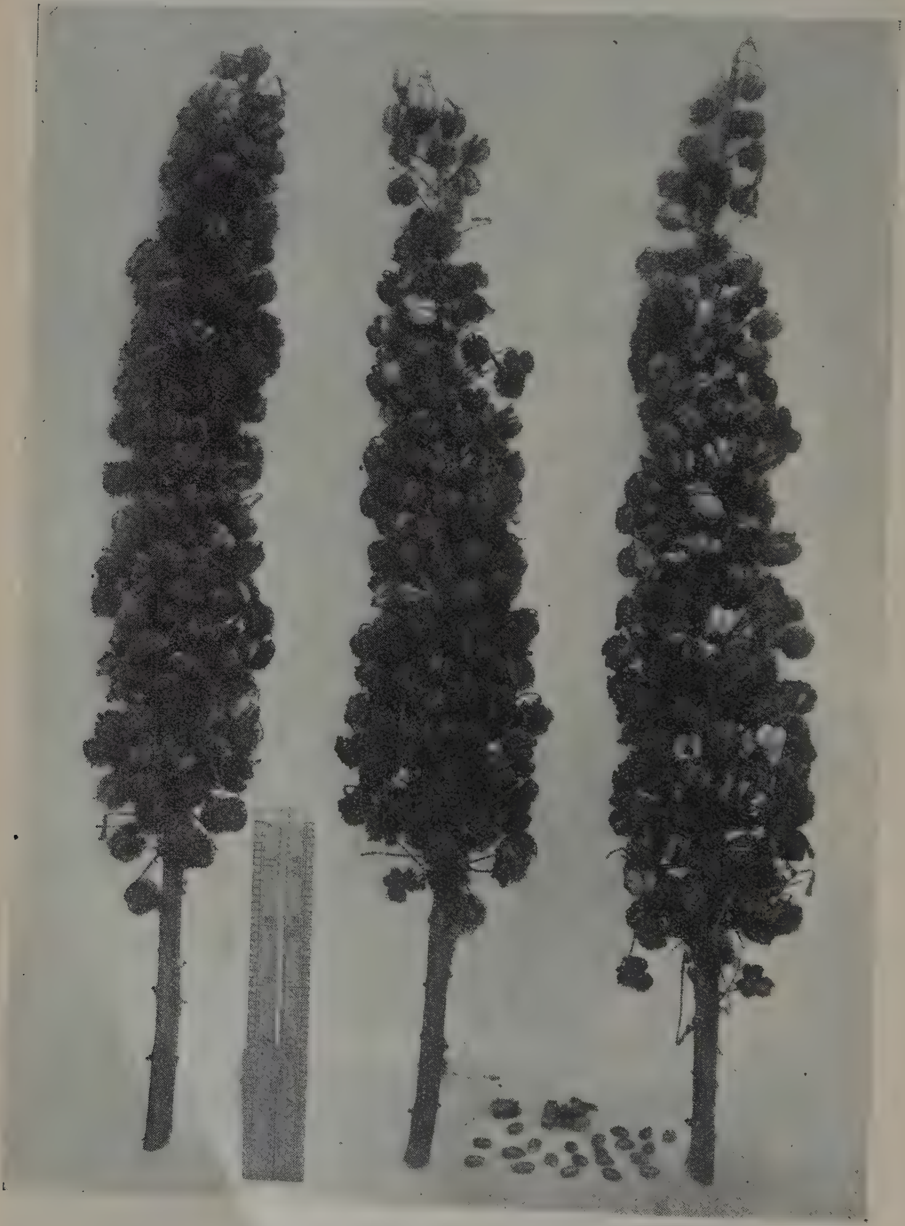

Plate 163.
Three heads of Castor Oil Seeds showing the characteristic seed husks.

Sampling of Seeds.

F. B. COLEMAN, Officer in Charge Seeds, Fertilizers, Veterinary Medicines, Pest Destroyers, and Stock Foods Investigation Branch.

FOR some time it has been apparent that various samples of seeds received for testing do not truly represent the bulks from which they were drawn, or are otherwise unsatisfactory.

The errors involved have included the following:—

(*a*) Samples have been drawn from far too small a number of bags.

(*b*) Some samples have obviously contained seeds drawn from two or more bulks of different origin.

(*c*) The marking of the sample has been insufficient to enable correct identification of the bulk at a later period.

It should be realised that as much care is necessary in obtaining samples as is taken with their examination. The examination of a sample is limited to the quantity received—all of which is under control. On the other hand, when drawing a sample the person concerned is often confronted with many difficulties. For example, the goods are stacked in awkward and often very inaccessible positions; sometimes hard physical work is required to draw a sample from even a small quantity. Variations in the goods themselves, &c., are other complicating factors sometimes met with.

All of these difficulties *must be overcome,* otherwise the sample is valueless.

The objective of any person drawing samples should be to obtain from the bulk a sample (or samples) truly representative of the bulk, irrespective of all or any difficulties that may be encountered, and to then mark this sample (or samples) in a manner that definitely connects up with the bulk.

One should always ascertain whether the whole consignment has a common origin and destination. A separate sample should be taken for each of the following:—

(*a*) Seeds of different kinds.

(*b*) Seeds of the same kind from different origins.

(*c*) Seeds of the same kind for different addresses.

(*d*) Seeds of the same kind bearing different brands or marks on the containers.

It is most important that each portion taken from a bag should be examined to see if it corresponds with the other portions which are together to comprise a sample. For instance, if, when taking a sample of seed there is an observed difference in the colour, size, or appearance of the seed, or the presence of insects or material other than seed, &c., then each difference should be represented by a separate sample; this would necessitate the examination of every bag in the consignment, and a classification of all bags into groups of similar types—one sample representing each different type.

It should be remembered that seeds are not like sugar, flour, &c.—standard products of a factory.

Experience teaches that seeds are liable to vary from bag to bag. Even a consignment from one farm sometimes varies, and further, no two fields necessarily produce seed of equal quality. Therefore, if only one sample is forwarded as representing a mixture of two or more lots of seed, good seed may be condemned or poor quality seed may be passed. *Sampling operations must include intelligent examination and, if necessary, grouping of the portions that are drawn to comprise the sample or samples.*

In cases where variations in a consignment are noticed—such as warrant extra samples—then the particular bags from which the various samples are drawn should be marked either singly or in groups with identification marks such as A, B, C, D, &c., to correspond with the various samples which should be similarly distinguished.

The weights of samples specified in this article are a minimum; larger quantities may be forwarded. The practice of extracting the overweight from a sample found to be slightly in excess of the minimum required, cannot be too strongly condemned.

Of course, in drawing a sample from a large number of bags, it is usually necessary to obtain far more than the minimum weight prescribed —in which case the sample should be thoroughly mixed and a suitable portion extracted as the final sample. This breaking down of large samples is dealt with later.

An understanding of, and strict adherence to the principles underlying sampling procedure are necessary to ensure that correct samples are drawn.

There seems to prevail an idea that drawing representative samples of seeds is a simple matter; the fallacy of such an idea is an ever-recurring fact in our experience.

Let us consider for what purpose samples are intended. In the case of seeds for sowing, the interested parties are concerned as to whether the seeds being sold comply with the prescribed standards. In the case of a producer, wholesale buyer, or wholesale seller, it is primarily desired that the bulk—maybe several hundred bags—is up to the standard prescribed. It is often not realised when handling these bulks that they may ultimately be sold in small parcels, which, of course, must also individually be of the desired standard. An individual purchasing, say, 30 lb. of seed for his own sowing, is only concerned that the parcel purchased by him is of a quality suitable for sowing.

We are now faced with the position that the wholesale buyer and seller are primarily interested in the bulk, whereas the retail buyer is vitally interested in the quality of his small parcel, which to him is of very great importance.

Unfortunately, the method employed by so many who forward samples for testing is based upon the rough and inefficient method of "grabbing" a few handsful of seed from any bag or bags; further, even this is often delegated to a junior employee. It is obvious that a sample obtained by this method cannot be taken as representative of every small lot that may be sold from the bulk. In certain cases, a number of samples from the one bulk are necessary.

It cannot be stressed too strongly that in drawing samples, as great care is needed in order to make the sample truly representative of the bulk, this important task should devolve on some responsible person who is capable of exercising judgment and discretion.

Sellers of seeds for sowing should realise when purchasing in bulk that they intend to sell in small quantities. Unless the bulk is uniform throughout, it is difficult for them to give their customers satisfaction and to escape the consequences of a breach of the Seeds Act. To illustrate what can happen with the incorrect drawing of samples, the following experience is given in detail.

A sample of *Paspalum dilatatum* seed was received from a seller and found to have a germination of 36 per cent. in six days. An examination of the bulk, bag by bag, however, revealed the following germinations:—

Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
20	22	21	3	11	25	26
21	20	44	20	29	27	28
28	7	22	30	20	31	24

An analysis of the above reveals the following:—

Number of samples that germinated—

Over 30 per cent.	2
20 per cent. to 30 per cent.	16
Under 20 per cent.	3

which means that probably only two, or at most three, bags were used to obtain the sample first examined. Any person who had bought on the sample submitted to this Seed Testing Station, to use a colloquialism, would have "bought a pig in a poke."

If the person who drew the sample in the first place had been experienced, he would have observed differences in appearance, or discovered differences in origin, and would have drawn samples representing several different lots or possibly would have taken a sample from each bag.

A further illustration of the results of incorrect sampling is as follows:—

A merchant forwarded a sample of oats for examination, which was found to contain only a trace of Cape barley and wheat, and 1·4 per cent. inert matter, mostly damaged seed. This sample was drawn from about twelve bags. When a seed inspector drew a sample from the same stock a few days later, he obtained his from over one-half of the bags—the bulk being 100 bags. The subsequent analysis of this sample revealed the presence of 1·8 per cent. wild oats, Phalaris, Cape Barley, and wheat, and 1·5 per cent. damaged seed.

The trace of weed and/or other crop seeds in the merchant's sample became 1·8 per cent. in the inspector's sample.

Because of the unsatisfactory position with respect to samples, all certificates and reports relating to samples forwarded by merchants, and buyers, to the Brisbane Seed Testing Station are marked as follows:—

> "This certificate is not a guarantee by the Department of Agriculture and Stock as to the bulk, but an analysis of the sample received and its condition at the time of such analysis."

Certificates relating to official samples drawn by inspectors of the branch do not bear this statement.

The usual method of drawing a sample is by means of a trier—a brass or steel tube with a sharpened end—which should be inserted to its full length into each bag and a small quantity of seed drawn off.

When sampling seed that does not run—such as Rhodes, Paspalum, and Prairie—a trier is useless, and, therefore, each closed bag must be cut, an "L" shaped incision about 2½ inches by 2½ inches being required. The hand should be inserted through the hole and a portion obtained for the sample.

When a small number of bags is being sampled it is necessary to draw a number of portions from each bag.

Not less than a trier full of seed or a handful should be drawn from any one bag.

The following rules summarise sampling procedure:—

When drawing samples it is of the utmost importance that they be drawn by a responsible person and care be taken to make them truly representative of the bulk.

To enable this to be done satisfactorily approximately equal parts should be drawn alternatively from the top, middle, and bottom of the bags, the proportion of bags to be sampled being as follows:—

1 to 19-bag lots—A portion from each bag.
20 to 39-bag lots—A portion from each of not less than 20 bags.
40 to 59-bag lots—A portion from each of not less than 28 bags.
60 to 79-bag lots—A portion from each of not less than 32 bags.
80 to 99-bag lots—A portion from each of not less than 36 bags.
100 to 199-bag lots—A portion from each of not less than 40 bags.
200 bags and over—A portion from each of not less than 20 per cent. of the total number of bags.

If, when drawing samples, it is observed that great variation occurs in the bulk, two or more samples should be obtained, each from bags whose contents are similar, and representing the variations that may have been noticed. These different lots should be marked with distinguishing marks, and the samples marked similarly.

After a sample has been drawn as above indicated, it should be emptied out on to a large piece of paper, thoroughly mixed, and then a quantity not less than the prescribed weight for the particular kind of seed should be drawn for purposes of forwarding to the Seed Testing Station. A duplicate sample should be kept for reference.

BREAKING DOWN LARGE SAMPLES.

To reduce large samples of seed, the following procedure should be closely adhered to:—

1. After drawing a representative sample from the required proportion of the bags or bulk, place the seed on to a large level sheet of paper, preferably on a table or bench.

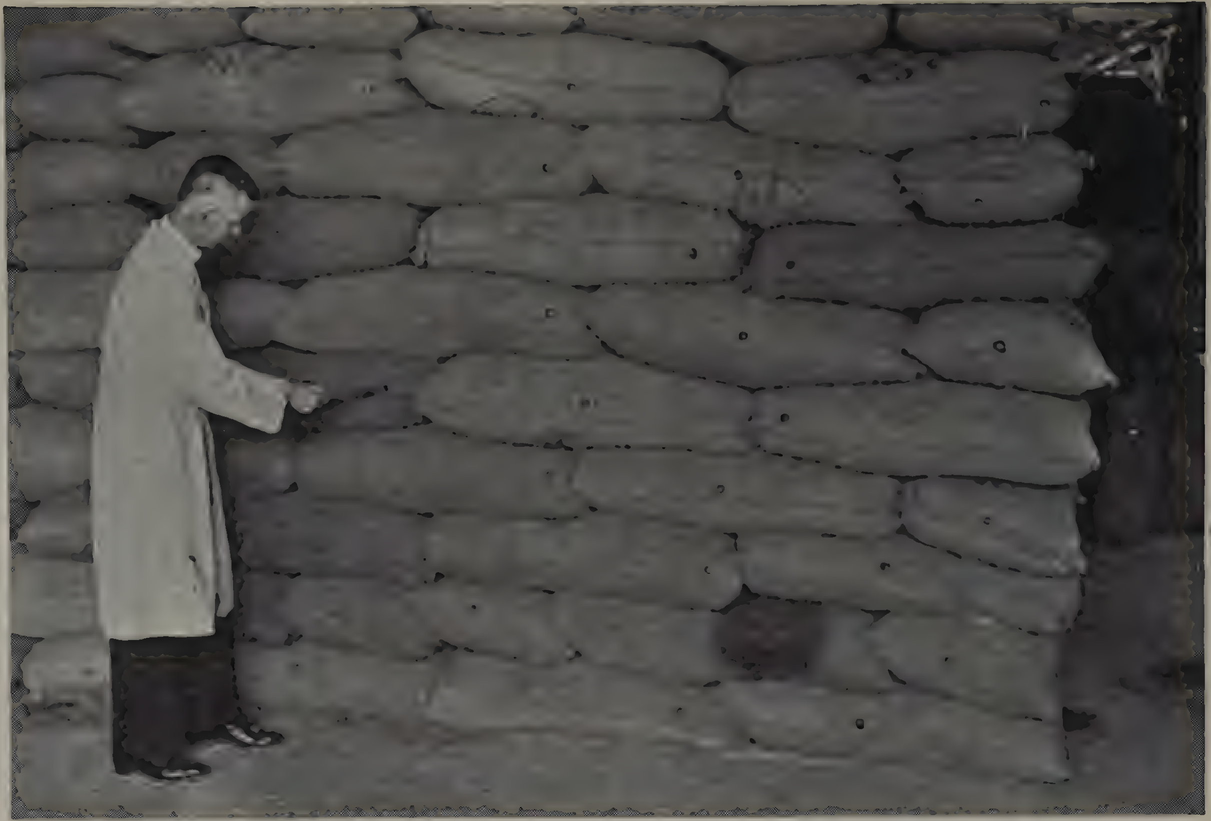

Plate 164

DRAWING OFFICIAL SAMPLES.—Note the trier marks in the top, middle, or bottom of the bags. The trier holes have been outlined with marking ink for purposes of demonstration; actually the holes left when rubbed with the point of the trier almost seal themselves up, and are practically unnoticeable.

2. Mix the seed thoroughly together by means of a spatula, plasterer's knife, or large knife blade, taking care the blade is inserted into the heap close to the paper, thereby lifting any small seeds, &c., before turning the blade over to form another heap. This should be done until all the seed has been turned over at least three times. Avoid mixing with the fingers, as this allows small seeds and fine material to collect at the bottom of the heap. This fine material *must be lifted up on the blade and mixed through the sample.*

Now proceed to divide the sample by levelling it out and dividing it into four approximately equal parts, simply by drawing the spatula or knife through the heap from top to bottom and left to right.

Now take the top right-hand part and the bottom left-hand part, place them together on a sheet of paper, and keep as the sample. The other two parts should be mixed together and retained as a check sample.

It is obvious that if a portion is rejected this procedure will reduce the size of the sample drawn. After mixing again, the dividing procedure can be repeated to further reduce the size, and so on, if necessary. Too big a reduction of size is not recommended.

A sample, after mixing and dividing, would appear somewhat as follows:—

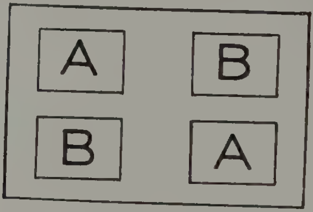

Plate 165.

Parts A, mix and keep as check samples.

Parts B, mix and forward for analysis.

Where samples are taken by inspectors, the Act requires the final sample to be in three separate packets, and a more complicated method of mixing and breaking down is used.

In the accompanying photograph of an inspector drawing an Official Sealed Sample, it will be observed that the stack is numbered 18370. The marking of the packets—Official Sealed Samples are divided into three parts—one for the vendor, one for analysis, and the third is retained by the inspector—would be as follows:—

"Sample of Oats drawn from 50 bags representing a total of 120 bags marked 18370.

Ex S., Farmer of Oatville.

Vendor, A. Seedseller, Summertown.
7th February, 1939."

Sealing is carried out by means of lead seals and sealing pliers which emboss certain marks on the seals.

Samples forwarded for examination should be of the following minimum weight:—

Kind of Seed.	Weight Required.
Barley	8 oz.
Beans	8 oz.
Beet	½ oz.
Cabbage	½ oz.
Canary	4 oz.
Carrot	½ oz.
Cocksfoot	3 oz.
Couch	3 oz.
Cowpeas	8 oz.
French Millet	4 oz.
Grasses	3 oz.
Japanese Millet	4 oz.
Linseed	4 oz.
Lucerne	4 oz.
Maize	8 oz.
Mauritius Beans	1 lb.
Millets	4 oz.
Molasses Grass	3 oz.
Oats	8 oz.
Onion	½ oz.
Panicum	4 oz.
Parsnip	½ oz.
Paspalum	3 oz.
Peanuts	2 lb.
Peas	8 oz.
Phalaris tuberosa	3 oz.
Prairie Grass	4 oz.
Radish	½ oz.
Rhodes Grass	3 oz.
Rice	8 oz.
Rye Corn	8 oz.
Rye Grass	3 oz.
Sorghum	4 oz.
Sudan Grass	4 oz.
Tares	8 oz.
Tomatoes	½ oz.
Vegetable Seeds in made-up packets	5 pkts.
Wheat	8 oz.
White Panicum	4 oz.

Where seeds are stored loose in bulk, the samples should be taken from various parts of the heap or bin, and should be of the like proportion, as nearly as can be fairly estimated, as would be required if such seed were in bags, so that a representative sample of the whole bulk is obtained.

In the case of seeds not mentioned above, the weight set out for the seed of nearest size should be forwarded.

In the case of seeds obviously containing weed seeds or other impurities, not less than double the weight mentioned should be sent.

In the Seed Testing Station great pains are taken to ensure absolute accuracy of work. It therefore follows that all this care is wasted unless the person forwarding samples for examination takes some trouble to ensure that the samples drawn truly represent the bulks from which they are obtained.

Marking of Samples.

All samples must be plainly written on in ink, setting out the undermentioned particulars:—

Sample of seed drawn from bags,
representing a total of bags.
Bags marked:
Purchased from , of , on
Name of sender:
Address:
Date:

The examination of samples without name and address of sender cannot be undertaken.

Samples should be addressed as follows:—

Seed Sample for Examiantion.
Officer in Charge,
Seed Testing Station,
Department of Agriculture and Stock,
Brisbane.

Special care should be taken to securely fasten up the sample. The examination of samples that have been opened in transit is useless for any determination, as only a sample received intact could be taken as representing any bulk.

Fee and Covering Letter.

A covering letter, enclosing the prescribed fee, should be addressed to the Under Secretary, Department of Agriculture and Stock, Brisbane.

The fee for a copy of the result of any examination of any seeds is as follows:—

1. 2s. 6d. per certificate; or
2. (*a*) £3 10s. for the first fifty certificates and thereafter 1s. per additional certificate during the twelve months ending 30th June, providing the sum of £3 10s. is paid in advance: Provided that—
   (*b*) In the event of any person claiming a refund of fees paid under 2 (*a*) on account of the number of certificates being less than fifty, such refund will consist of the amount left after the charge of 2s. 6d. per certificate has been made.

Free Examination.

Samples representing seeds purchased by farmers for their own sowing are examined free of charge, providing that the full particulars as above are marked upon the sample and a covering letter stating the purpose for which the seed is to be used is forwarded.

Complaints.

In case of any complaints regarding analytical purity or germination, the buyer should at once send a sample of the seed, marked with the particulars as above set out, together with a covering letter to the Department advising of the despatch of the sample; this will be examined free of charge.

Examine Goods on the Day of Delivery.

Both buyers and sellers are urged to examine all goods on the day of delivery, and when in doubt regarding any seeds, fertilizers, veterinary medicines, pest destroyers, or stock foods, communicate at once with the Department of Agriculture and Stock, Brisbane, in order that the matter may be investigated.

Plate 166. [*Photo.: Lands Dept.*

A Bend in the New Road through the Rain Forest, Danbulla, North Queensland.—Magnificent timber lands and new settlement areas are now easily accessible through the skill of the surveyor in alliance with the engineer.

The Suitability of Thinnings of Pinus taeda and P. caribaea for Pineapple Cases.

C. J. J. WATSON, and D. MOORE, Queensland Sub-Department of Forestry.

THIS report covers a study of the suitability for pineapple cases of timber from nine-year-old unpruned thinnings of *Pinus taeda* and *P. caribaea* grown and sawn at Beerwah, South Queensland.

The general requirements of a fruit case timber are discussed with reference to hardwood and softwood, and the properties of the wood of thinnings of *Pinus taeda* (loblolly or North Carolina pine) and *P. caribaea* (slash pine) grown at Beerwah are considered in relation to these.

The fast grown thinnings were found to be comparatively light and the properties of workability, softness, nail-holding power and colour were very satisfactory for case requirements. The frequency of knots, staining, and the allowance of bark are discussed. The sizes of the boards for making up into cases are considered and the green dimensions to yield the best results are recommended.

Service tests on both timbers were carried out, and the results with packed cases sent to Sydney, Melbourne, and Auckland are given. Trade comments showed that the cases had a definite appeal, both to the grower and the buyer.

In the area from Caboolture to Gympie, including the Kilcoy and Mary Valley branches, it is estimated, on the basis of 1935 production, that about 10,000,000 super. feet log measure (Hoppus) of Pine thinnings are required to meet the annual fruit case requirements. However, on account of the cheapness of the hardwood case (11d. per 1½-bushel case) compared with the pine case (1s. 1d. per 1½-bushel case), about two-thirds of the cases used for bananas and pineapples are of hardwood.

At present, the quantity of pine used annually for all types of fruit cases in this area is estimated at 4½ million super. feet log measure (Hoppus).

Requirements of a Fruit Case Timber.

The present demand for fruit case timbers in Queensland is met by both hardwood (mainly rose gum, the lighter and softer types, blackbutt, and white gum) and hoop pine, the latter being used where a more attractive case is required. The general requirements of fruit cases in Queensland may be summarised as follows:—

Lightness in Weight.—This is important insofar as easy transport and handling are concerned, but the grower is more concerned with lower cost of the hardwood case than with its heavier weight.

Strength.—The mechnical strength of a container is determined to a great extent by the method of nailing and strapping. Both pine and hardwood have sufficient strength for normal fruit case requirements. Knots can be included providing these are not placed in positions which might affect the nailing or the strength.

Grain and Colour.—This must be fairly smooth and attractive and preferably light-coloured for printing and labelling. In this respect, Hoop Pine is preferable, but the trade appears to accept the darker-coloured hardwood case without prejudice.

Workability.—Pine is superior to hardwood as far as softness and easy working are concerned, but the softer and lighter types of hardwoods are used with success.

Freedom from Taints and Moulds.—This is more important in the case of food containers than for fruit cases as far as odour and taste of the woods are concerned, providing this is not entirely objectionable. Certain moulds (such as *Penicillium*) may be harmful to fruit, and care in seasoning is necessary on this account.

Nail-holding Power.—The injury to the contents of the cases depends greatly on the nail-holding power of the timber. The hardwoods often split when ordinary pointed nails are used and the hold is decreased thereby. Blunt nails tend to overcome this trouble.

In the United States of America, it is estimated that the *Pinus taeda* (loblolly or North Carolina Pine) constitutes 70 per cent. of the total amount of yellow pine used for boxes. It is regarded as eminently suitable for this purpose, not only on account of availability and relative cheapness, but because of its softness, good working qualities, and lightness in weight.

The thinnings from the Beerwah plantations are of fast growth and generally less than six rings per inch, which standard is accepted as the optimum for strength purposes. In the first three inches of radial increment the typical rate of growth in stump sections is greater than 2 rings per inch. This growth rate slows down to 3-4 rings per inch and in some cases to 6-7 rings per inch in the 3-inch-4-inch zone measured from the pith. The rate of growth shown by cross-sections higher in the tree are somewhat similar.

The wood from the thinnings is thus lighter than the wood from the more mature trees, but is sufficiently strong for cases. The higher percentage of the softer early wood appears to be beneficial rather than deleterious as far as the nail-holding power is concerned. The lighter weight of the cases of the two Pinus species was favourably commented upon by growers as giving less labour in handling both in shooks and cases.

The workability, softness, and other properties were found to be excellent, and in every way equal to the first quality Hoop Pine.

According to American investigators (Benson H. Paul and A. Koehler), wood of fast-grown *P. taeda* trees showing less than four rings per inch generally shows an excessive longitudinal shrinkage. This defect has been found in some specimens of both *Pinus caribaea* and *P. taeda* grown at Beerwah and is being further investigated.

Even if excessive longitudinal shrinkage occurs through a large part of the fast-grown material, the observations on seasoning have shown that this will not be detrimental to its use for cases, since the shrinkage in a small piece is fairly uniform and the timber is dried before use.

Although some boards showed light-blue staining in places due to rather slow drying and showery weather, this did not spoil the appearance of the case and there was no objection by the growers. The dry pine did not stain the hands as did the hardwoods in a semi-seasoned state.

Growers did not object to a little bark on both edges providing the boards were reasonably strong, and such defects in a few boards enabled a reduction in price to be made. *Mr. Gregory stated, however, that the bark left on some boards was slightly wider than he would recommend and suggested a maximum of ¼ inch on *one* edge as a reasonable limit.

Knots were accepted as satisfactory by growers for pineapple cases, but should be limited in banana cases tops and bottoms in which the boards have a considerable bulge resulting in much greater stressing. The weight of packed banana cases are also greater necessitating a greater freedom from knots and defects than pineapple cases. The packed weights of the two cases are—

Pineapple cases	56 to 60 lb. per case.
Banana cases	98 to 116 lb. per case.

The ease with which the Pinus cases nailed was superior to hardwood and also better than Hoop Pine, splitting being absent on account of the greater toughness. An empty case, thrown 15 feet on to its corner, showed no splitting at the nails, and this was stated to be highly satisfactory for such a severe test. The nails were drawn slightly (about ⅛ inch) and were tapped back into place again, restoring the stability of the case.

The nails recommended by the Department of Agriculture and Stock for banana and pineapple cases are—

Into "end grain"	1¾ inch by 14 gauge.
Into "side grain"	1½ inch by 14 gauge.

The use of the longer nails in the "end" grain would give a case of uniform strength on account of the decrease in holding power of nails driven parallel to the grain.

In practice, however, it was found that most of the growers used 1½-inch by 14 gauge nails all round for pineapple cases and did not get complaints.

In order to secure a direct comparison with the Hoop Pine and hardwood cases now used, Pinus species cases were made according to the usual trade practice for the service tests.

Green Dimensions of Case Boards.

The boards were cut to the following measurements (green size):—

Ends	6 inch by ¾ inch by 12 inch.
Cleats	2 inch by $\frac{7}{16}$ inch by 12 inch.
Sides	3¾ inch by ⅜ inch by 26¼ inch.
Tops and bottoms ..	6 inch by $\frac{5}{16}$ inch by 26½ inch.

In a few cases it was found that the widths of the ends and cleats were slightly oversize, due to the shrinkage allowance being too great or the boards being cut oversize. In the end boards, the seasoned width for making up should not exceed 5$\frac{15}{16}$ inch, allowing the two pieces to be loosely pushed together to give a neat 12-inch width. Growers prefer a slight gap between inner edges of end boards to overwidth pieces which make the case exceed the 12 inches in inside height. At present many of the hardwood "ends" are as narrow as 5½ inch. The standard internal case measurement is 12 inches, and cases less than this, although often seen, are contrary to regulations. Three piece ends would be permitted if securely fastened to the cleats, the boards being of equal width.

---

* Jas. H. Gregory, Instructor in Fruit Packing, Department of Agriculture.

Some cleats were unnecessarily wide and a maximum of 2 inches and minimum of 1¾ inches has been recommended by the Department of Agriculture and Stock.

The tops and bottom boards were satisfactory for pineapple cases, but the presence of too many knots towards the centre would render some of them undesirable for banana cases. For the banana cases, two 6-inch wide boards must be used for "tops" and "bottoms" to avoid bruising, but for pineapple cases the "tops" and "bottoms" can be made in three 3⅜-inch wide boards similar to the "sides." This concession in pineapple cases will materially assist in securing a greater number of cases from small Pinus logs, the only wide boards being the ends which can be sawn $5\frac{15}{16}$ inches wide by ¾ inch thick by 12 inches long.

For the sides, it has been customary to use two 4-inch-wide boards at the edges and one 3-inch-wide board between these, as it is believed that a greater sawn return is secured. Some sawmillers, however, prefer to cut all "sides" the same width (to finish 3⅜ inches) and make three uniformly wide boards to the case side. This method saves considerable time in altering the "fence" on the bench which is probably more important.

The thicknesses of the boards were apparently quite satisfactory.

The following neat green board sizes for pineapple cases are recommended:—

	Ends. Inches.	Cleats. Inches.	Tops and Bottoms. Inches.	Sides. Inches.
Width	$5\frac{15}{16}$	1¾ to 2	3¾	3¾
Thickness	¾	$\frac{7}{16}$	⅜	⅜
Length	12	12	26½	26¼

These sizes will also provide for banana cases for all boards except "tops" and "bottoms" which must be in two boards, each $5\frac{15}{16}$-inches wide.

Service Tests and Reports.

Twenty-seven (27) cases of pineapples packed at Palmwoods and Montville were forwarded to Sydney for examination by officers of the New South Wales Forestry Commission and the Manager of the Committee of Direction of Fruit Marketing. Thirty cases packed in the same areas were sent to Melbourne and a number was examined by an officer of the Council for Scientific and Industrial Research, Division of Forest Products.

Reports and trade comments on these cases were as follows:—

Sydney (New South Wales Forestry Commission).

"Two cases were seen. . . . both being in a first-class condition without any depreciation due to handling. Mr. Wilson states that the cases are first rate and are satisfactory in every respect.

"Five cases were examined at the C.O.D.,* all of which were also in a first-class condition with no sign of breakage. . . . One of the hands who has had considerable experience with pineapple consignments stated that he could find no fault with the cases. . . . In the same consignment certain hardwood cases were damaged, but this did not apply to those made from the pine. One of the hands thought that the knots near the ends of the boards might allow breakage to occur. He was also concerned that nails could be driven so easily into the ends, but against this is the fact that the nails do not draw too readily, which is an important point, so altogether the objections do not appear to be of any serious consequence."

Sydney (Manager, Committee of Direction of Fruit Marketing).

"A good tough material much superior to hardwood both in appearance and rigidity when built. In comparison with the matured well-seasoned pinewood it appears sappy and coarse in texture. Six-inch boards show evidence of difficulty to cut without including bark and an irregular edge; this disability is fully compensated for by its clean appearance in every other respect and the useful feature to withstand the rough handling frequently experienced in transit."

Melbourne (Council for Scientific and Industrial Research, Division of Forest Products).

"The cases arrived in good condition and appeared to have stood up to transport handling as well as ordinary types of pineapple cases. They were of standard construction and of good appearance. Trade comments were favourable as follows:—

A.—The employee in charge of case handling considered the *P. taeda* cases consigned . . . equal in service value to customary types. He believed that the softwood was springier and likely to cause less bruising of the pineapples.

B.—The cases . . . had been sold before advice to inspect was received, but the consignee stated that he had been favourably impressed with them. He stated he was satisfied with their quality and expressed a preference for them compared with hardwood on account of weight and appearance, and believed they could carry pineapples better."

Comments made on this timber both from the growers and from the marketing trade have been favourable.

Pineapples were also packed by a grower at Victoria Point, Queensland, in 20 cases of *P. taeda*, and four cases with *P. taeda* sides and *P. caribaea* ends, and shipped to New Zealand. It is of particular interest to note that these cases were packed with the aid of wood wool made in Brisbane from *Pinus taeda* thinnings.

The consignor reported later that he was in a position to state that the case appealed to him in every way, and enclosed a letter from the consignees in answer to his request for their opinion.

He also stated that the cases were shipped in the usual way and wired, which is necessary for distant markets with any class of case.

The consignees at Auckland commented as follows on the cases:—

"The cases appear to be quite satisfactory and we feel confident in assuring you that you can safely use this box in future.

---

* Committee of Direction of Fruit Marketing, Queensland.

"You will be pleased to know that the fruit arrived in good condition . . . ."

In view of the above reports and the opinions of many interested growers there is no doubt that the cases appeal to the trade from the points of view of appearance, facility for nailing, toughness and lightness, and are sufficiently strong for normal trade practice.

Fruit Case Statistics.

The number of fruit cases required for the area from Caboolture to Gympie and including the Kilcoy and Mary Valley branches have been estimated from figures supplied by courtesy of the Committee of Direction of Fruit Marketing, to be as follows:—

Type of Case.	Est. No. of Cases.	No. of Super. ft. (Face measure)	No. of Super. ft. (solid measure) Per Case.	Total.
1½ bush.	1,000,000	11,660,000	4·83	4,830,000
1 bush.	300,000	2,502,000	2·56	768,000
½ bush.	200,000	1,104,000	1·65	330,000
Total ..	1,500,000	15,266,000	..	5,928,000

The equivalent number of super. feet (face measure) has also been calculated in the table above.

The case requirements for this area is estimated at about 6,000,000 super. feet of sawn timber (solid measure).

In progress report No. 1 of this Project, the sawn yield on log volume (Hoppus) was estimated at 60 per cent. for small diameter logs of thinnings of *Pinus taeda* and *P. caribaea*. On this basis about 10,000,000 super. feet log volume would be required to meet the case requirements of the above area.

The 1½-bushel cases are supplied both in hardwood and pine, the proportion of pine (according to the Committee of Direction of Fruit Marketing) being approximately one-third for this type of case, the other types being mainly pine.

The present requirements of sawn timber would thus be—

Hardwood (mainly *Euc. grandis*)	3,250,000 super. feet.
Pine	2,750,000 super. feet.

On this basis, the approximate annual log requirements of pine for fruit cases in this area based on 60 per cent. recovery would be approximately 4,500,000 super. feet (Hoppus). It is to be noted that these estimates are based on 1935 figures.

According to the "Queensland Year Book" for 1938, bananas and pineapples are the most important Queensland fruit crops, and were worth approximately £283,000 and £245,000 respectively in 1936-37. These fruits are produced chiefly in the Moreton and Wide Bay divisions.

Acknowledgement.

It is desired to express our appreciation of the assistance rendered by the Department of Agriculture and Stock, and in particular, Mr. J. H. Gregory, Instructor in Fruit Packing, for his helpful information in fruit case construction, and arranging the packing and forwarding of the experimental cases by experienced growers.

Thanks are also due to Mr. F. Nicklin, M.L.A., and Mr. H. Willmott, Victoria Point, who participated in the service tests and supplied valuable reports.

For fruit case statistics and service reports, we are indebted to the Committee of Direction of Fruit Marketing, Brisbane, the Division of Forest Products, Council of Scientific and Industrial Research, Melbourne, and the Division of Wood Technology, N.S.W. Forestry Commission, Sydney.

Finally, the packing and service tests could not have been carried out without the generous assistance and co-operation of the Queensland Fruit Growers' Society and principal growers at Palmwoods, Montville, and Victoria Point, all of whom showed a keen interest in the tests.

REFERENCES.

N. C. BROWN: Forest Products—Their Manufacture and Use (1919).
BUREAU OF INDUSTRY, QUEENSLAND: Queensland Year Book, No. 2, 1938.

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SCIENCE IN FARMING.

The successful farmers in the near future will be the young farmers of to-day who are being trained in the use of scientific methods.

In the Old Country, particular attention is being given to improving the quantity and quality of beef in each animal, as the beef industry is of outstanding importance to the British farmer. Attention also is being given to scientific principles in the raising of all kinds of crops, so that acreage yields may be greatly increased. In Canada and the United States the same principles are being applied. In both those countries, the young farmer movement is very active. It is the same in New Zealand, where scientific methods have almost standardised the size and quality of the lamb and mutton exported to Great Britain.

Below the border, in New South Wales, junior farmers' clubs are taken seriously and they are increasing in numbers and influence. In Queensland, the young farmers' project clubs are also growing in strength. Down south, young farmers are entering crop competitions and are winning prizes against much older competitors. In a competition in the Murray Valley, a member of a junior farmers' club succeeded in growing maize at the rate of two hundred (200) bushels to the acre, although the average of most growers, under similar conditions, was much less than half that quantity. That crop, of course, must have been grown under irrigation.

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BRISBANE.

Wood Wool for Pineapple Packing.

C. J. J. WATSON, Sub-Department of Forestry.

THE qualities of wood wool for industrial purposes such as the packing of breakables, confectionery and toys, and for upholstery and filtering are well known, but only recently has it proved to be of great value in pineapple culture under Queensland conditions.

In the pineapple industry, practical tests by fruit culture experts of the Department of Agriculture have shown that a special grade of wood wool is the most suitable material for—

(1) Protection of the ripening fruit against sun scorch;

(2) Packing matured fruit in cases for marketing.

Pineapple Protection.

During the long hot days and clear skies which are typical of the Queensland summer climate, the adequate protection of maturing pineapples becomes imperative if severe losses from sun scorce are to be avoided.

Grass and other materials have been used for this purpose, but wood wool of a special type has proved to be the most effective protection while being economical in use.

For this purpose, wood wool should be made from selected timbers possessing long tough fibres, while the strands must be accurately manufactured within specified limits with regard to width and thickness. These precautions have been found to be essential to give a product which will provide the correct coverage and protection from the sun, while teasing out well and wrapping securely round the fruit. It has been shown that wood wool with wide thin strands gives the best results.

Wood wool which does not afford adequate protection against the sun's rays, or is brittle in handling and does not hold securely to the fruit in all weathers, is wasteful to the grower both in material and in fruit.

Packing.—The principal requirements in wood wool for pineapple packing are the necessary strength and resilience to support and protect the fruit from damage during transit, attractive appearance, and freedom from odours and mould growth.

As a general packing material, good quality wood wool is much superior to sawdust or straw, as it is free from dust and dirt, in addition to being highly elastic and very light. For packing fruits and other food materials, it must have a light colour and be free from any disabreeable odours, resins, or moulds likely to taint or discolour the materials packed.

To give satisfactory teasing and avoid waste in short ends woods which are cross-grained or brittle in nature must be avoided, and the wood wool strands should not be too thick.

It is also essential to use wood wool which has been dried to a sufficiently low moisture content. Wood wool which is baled in a moist condition rapidly becomes hot and musty in the interior with the possible risk of firing. High moisture contents also encourage the development of wood staining and fruit-destroying fungi in packed cases. On the other hand, overdried material becomes brittle and much of it may be wasted from breakage into short ends.

It has been found that some pineapple growers have suffered severe losses through the use of certain types of wood wool wihch are totally unfit for field covering purposes and not good for packing.

Complaints have also been made of the lack of standardisation in wood wool offered to growers, and the absence of any descriptive grade which can be confidently recommended to give good results.

In order to assist growers to secure a product of uniform quality suitable for the needs of the industry, the whole problem has been fully considered by fruit culture experts of the Department of Agriculture in conjunction with officers of this department. In addition, a number of practical tests have been made.

On the information secured from this work, the Queensland Forest Service has now prepared the specification given below. This is designed to give the best results both for preventing sun scorch and packing pineapples, and growers are now recommended to order "Q.F.S. Grade A Wood Wool" for all their work.

Wood Wool Specification for Pineapple Culture.

1. *Scope.*—This specification of the Queensland Forest Service applies to wood wool for use in the pineapple industry of Queensland for (*a*) covering the fruit in the field, and (*b*) for packing fruit for shipment.

2. *Timbers.*—The timbers permitted under this specification shall be—

Hoop Pine (*Araucaria cunninghamii*).
Bunya Pine (*Araucaria bidwillii*).
Taeda Pine (*Pinus taeda*) or other approved timbers.

3. *Moisture Content.*—The moisture content calculated on the oven-dry weight shall not exceed 10 per cent., nor be less than 10 per cent. at the time of baling.

4. *Grade Descriptions*—

Q.F.S. Grade A.—Wood wool to be white to cream in colour from straight-grained wood, tough and resilient in fibre, and free from gums, resins, stains, moulds, impurities such as dust, chips, and short ends under 4 inches in length, and any disagreeable odour.

Average fibre width, $\frac{3}{16}$ inch. Average fibre thickness, $\frac{1}{250}$ inch.

Q.F.S. Grade B.—Wood wool to be cream to light-brown in colour from straight-grained wood, tough and resilient in fibre, and free from gums, resins, dark stains, moulds, more than 2 per cent. by weight of short ends under 4 inches in length, and strong odours.

Average fibre width, $\frac{3}{16}$ inch. Average fibre thickness, $\frac{1}{250}$ inch.

The Depreciation of Soil Productivity.

[Bank of New South Wales Circular, Vol. IX., No. 1 (January, 1939); reprinted by kind permission of the bank authorities.]

I.—Two Conflicting Influences.
II.—The Trend of Output from Primary Industries.
III.—How Deterioration Occurs.
IV.—The Extent of Soil Erosion in Areas of High Rainfall.
V.—The Problem in the Pastoral Areas.
VI.—Plans for Soil Conservation.

I.—Two Conflicting Influences.

THERE are two conflicting trends at the present stage in the development of Australia's primary industries. On the one hand is the continued increase in production from nearly every branch of farming and pastoral activity due to the use of more intensive methods and increased expenditure on equipment, and on the other, a decline in the productivity of many areas due to the damage done by soil erosion and pasture deterioration.

These trends counter-balance one another in their effects on total production. For example, soil erosion may have caused a decline in the number of sheep which can be carried on a given area, but the yield of wool per sheep may have been increased by careful breeding and as a result there is no marked change in the total production. Nevertheless the full value of expenditure and effort in improving the quality of the sheep is not obtained, while the real extent of the loss caused by erosion is not apparent. In any attempt to estimate Australia's capacity for primary production in the future, it is essential that the relative importance of each of these factors should be determined. The main purpose of this article is to review those factors influencing the capacity of Australia's soils to produce wealth.

II.—The Trend of Output from Primary Industries.

In the twenty years since the Great War the total volume of primary production in Australia has increased 50 per cent. Under the influence of high prices and good seasons there was, until 1929, rapid expansion of wool and wheat production on the one hand and of the more intensive primary industries on the other. But when the stimulus of high prices was removed the rate of increase in production was checked and separate trends became apparent for the two groups.

First, both wool and wheat showed a pronounced slackening in the rate at which production was increasing. Gains in total wool production during the last ten years have been very small and have resulted mainly from pasture improvement in southern areas of high rainfall. In the vast pastoral areas of low rainfall and the tropical two-fifths of Australia which carry a big proportion of the sheep population, much increase in production by using such methods is not to be expected. Nor can a great deal be expected from the further extension of areas occupied by sheep in the arid regions, for in the last period of high prices sheep settlement was extended practically to the geographical limits, and, in some cases, actually beyond sound limits. Again, stock-carrying capacity has been increased in the past largely by providing additional water and fences, which improved the thoroughness and efficiency with which pastures could be utilised. But these must be regarded as methods which have already been applied fairly widely and will not be as important again. It seems that possibilities for increased wool production from these areas lie not so much in the land as in improved methods of sheep breeding and management. Such gradual developments will be more than nullified if the present soil and pasture deterioration continues.

Wheat growing had been extended into marginal areas of doubtful value under the influence of economic and political stimuli which are not likely to be repeated, and to-day the acreage sown has returned to about the same level as it was ten years ago.

Improvements in cultivation methods and wheat varieties have not caused an increase in production from this acreage, for they are offset by unreliable yields in marginal areas and the results of unwise farming by producers who fail to adopt soil-conservation practices. In both the wool and wheat producing areas it is apparent that there is urgent need to conserve soil and vegetation if production is to be maintained.

The areas of intensive farming are comprised within Groups I., V., and VI. on Map I., which shows the general distribution of carrying capacity. Within these areas there has been a continued rapid increase in production of butter, cheese, and fat lambs, while in the irrigation areas, dried and canned fruits can be produced to the limit of the available markets. These increases have been made possible by improvements in farming methods, such as the more general adoption of pasture improvement, by the extension of irrigated areas in the Murray Valley and in Western Australia, and by reclaiming prickly-pear land and opening up new areas in Queensland. The map shows that these regions of intensive production form a relatively small part of Australia, although their economic importance is relatively great. They include those districts where erosion by running water is most serious. Therefore, if the nation is to reap the benefit of progress in methods of farming it is necessary that any deterioration of the soils in these areas should be checked.

The plain fact is that hitherto the importance of conserving soil and pastures has not been sufficiently observed. There are vague misgivings that we may have been profligate in our use of the land, but there is no general appreciation of the nature and extent of the problem. Immediate difficulties always receive more attention than long-term developments of greater importance. The loss of 2,000,000 sheep in a drought-stricken State is regarded with much public concern, but the fact that, at the same time, 20,000,000 acres of land may have suffered permanent damage which greatly lowers their productivity is usually given only slight attention. At the same time, soil conservation is hindered by alarmist and ill-informed reports, such as the much-discussed theory that the pastoral areas of South-western Queensland are threatened by the encroachment of sandhills from the deserts in the centre of the Continent. A recent pamphlet of the Council for Scientic and Industrial Research* shows that there is no foundation for this idea, although in the marginal areas some old sandhills have lost their former stability. These spectacular theories do harm by diverting attention from the real deterioration in pastoral areas caused by forces operating locally.

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*C.S.I.R. Pamphlet No. 70. "Further Observations on Soil Erosion and Sand Drift, with special reference to South Western Queensland," by F. N. Ratcliffe, B.A.

In the same way, oft-repeated comparisons with countries like Brazil and parts of South Africa, such as the native reserves, have little value in assessing the Australian position where agriculture and grazing are carried on against an entirely different sociological background. If we are to understand the potential effect of erosion on primary production, the first need is a survey of the facts of the problem in Australia.

III.—How Deterioration Occurs.

Occupied land suffers in two ways; first, by erosion of soil due to the action either of running water or wind, and secondly, by deterioration of fodder plants and soil fertility under occupation, even although soil has not been removed.

Probably the most serious form of soil erosion in its total economic importance to Australia is that caused by running water, but because the greater part of Australia has a fairly low rainfall, erosion by wind is more widespread than that by running water. Under natural conditions before white man's occupation, the soil on most of the forests and grasslands was more or less in equilibrium. The formation of new soil kept pace with the removal of soil by erosion which was very gradual and small. Most activities of man in preparing land and using it for cultivation or grazing animals have tended to upset this equilibrium and hasten the removal of soil.

One example of this is seen in the well-watered, hilly and mountainous regions of New South Wales and Victoria, which comprise some of Australia's most valuable grazing lands. To develop them and encourage the growth of grass, it was necessary to destroy forests. This was quite justified and could enhance the productive value of the land if carried out wisely and with due discrimination on dangerously steep slopes. But there was much unwise and excessive clearing of trees from positions where they were essential to prevent erosion. Also, many trees of great commercial value were indiscriminately destroyed. Where forests have been replaced by scanty pastures providing poor ground cover, often made worse by over-grazing, rainfall is not retained as effectively as on virgin bushland, and with increased run-off, loss of soil follows. Where sloping land is cultivated the same factors operate in still greater degree.

Wind erosion occurs mainly on wheat lands in low-rainfall areas and on certain of the semi-arid pastoral lands. The cause in both cases is the almost complete destruction of natural vegetation on soils of sandy to loamy texture which have proved to be readily susceptible to erosion. The wheat areas affected are in fairly well-defined districts, but the problem in pastoral areas is more complex. Both types are discussed in a later section.

Under many conditions where there is little actual erosion of soil, serious depreciation of pastures and fodder plants is taking place. The map of general distribution of soil erosion (Map II.) shows that about one-half of the occupied area of Australia is not subject to widespread and serious erosion, but this does not mean that there is cause for complacency about its continued productivity. A major factor causing depreciation in the quality of pastures is that for nearly a century they have been continuously grazed with no replacement of the minerals taken away from the soil in wool, meat, hides, and milk. As a result, original pasture species have been replaced by those whoch can subsist on lower soil fertility but which are also lower in nutritive value.

Deterioration of this type can be rectified by scientific fertilizing with, in many cases, the introduction of new pasture species. Such practices are rapidly gaining ground, but there is great need for more activity by many graziers and farmers. It is well established now that pasture improvement can be made a profitable investment under a wide range of soil and climatic conditions comprised approximately within the areas under Groups I., V., and VI. in Map I. There is the further advantage that by increasing the amount of cover on the ground and improving soil texture and water-retaining capacity, erosion can be effectively checked.

The vast sheep grazing districts of Queensland (see Map I.), which have been classified here as not subject to soil erosion, are an important example of an area where deterioration is suspected but where pasture improvement is not applicable. In the main they comprise soils which are not very easily eroded, although there is serious local loss around natural watering places and dams, where erosion occurs along animal pads with consequent accumulations of silt. Among the most valuable regions are extensive downs of fairly heavy soils, carrying annual grasses and herbage, and perennial grasses such as Mitchell grass (*Astrebla* spp.) which provide the principal stand-by in dry times. During the severe droughts of recent years the Mitchell grass disappeared to an unprecedented degree and there were misgivings about the future of these areas. However, when good rains came again, there was a remarkably good recovery.

The important question is whether that recovery was complete. It is very difficult to obtain a satisfactory comparison of the present quality of the pastures with that before the drought period which started in 1926, for there have been no scientifically conducted observations and general opinion is extremely varied and contradictory. There is evidence, however, to show that in many areas denuded in the droughts much Mitchell grass has been replaced by plants of little fodder value such as rolypoly (*Salsola* sp.), and by shorter-lived herbage species (*Bassia* spp., &c.) and annual saltbushes (*Atriplex* spp.). The reasons for this are by no means obvious. In some cases it may be due to heavy stocking of Mitchell grass seedlings, which for about the first six months of growth are shallow-rooted and easily pulled out by grazing animals. If this has been repeated after several rains, each of which has produced germination, the supply of seed in the ground may be depleted. Or it may be that Mitchell grass seedlings become established less successfully under present conditions when there is competition from a greater number of other vigorous plants. On the other hand, there are confusing cases where unstocked paddocks have shown a poorer regeneration of Mitchell grass than have paddocks well-grazed. Apparently regeneration of Mitchell grass is a complex question varying with the grazing history of an area for several years back and with local soil and climatic conditions and, at present, little is known of the true relationship between these factors. As long as this fundamental matter affecting the pastoral industry of vast areas of Queensland is in doubt, there is need for far more vigorous and comprehensive research than is being carried out at present.

IV.—The Extent of Soil Erosion in Areas of High Rainfall.

No detailed erosion survey of any considerable area has yet been attempted in Australia and, until surveys have been undertaken, there will always be doubt as to the exact significance of the problem. The map of the general distribution of erosion in Australia (Map II.) combines the results of several investigations of a reconnaissance nature, and presents an approximate picture of the problem divided into its broad classifications.

One of the most interesting facts revealed in this map is that the more serious forms of erosion are far less widespread than in the United States of America.* This applies particularly to the area subject to severe water erosion, providing yet another example of the fallacy of assessing Australian problems by comparisons with a country of very different geographical conditions. In Australia the agricultural areas receiving a high rainfall are several times smaller than those in the United States and less extensive water erosion is to be anticipated. Again, the intensity of water erosion within the agricultural regions of Australia is probably less than in corresponding parts of the United States because of the smaller area devoted to crops such as cotton, maize, and tobacco, which are cultivated repeatedly between the rows.

The really important fact brought out by the map is that within the region of serious water erosion is situated a large proportion of the most intensively developed and highly productive land in Australia. Competent observers have commented on the rapid rate at which erosion is developing and on the lack of measures to check this.

Perhaps the most seriously eroded soils are in the wheat belt receiving a moderately high rainfall. These extend in a fairly continuous belt from the Darling Downs in Queensland, through the north-west slopes of New South Wales adjoining the black soil plains and southwards along the inner side of the Great Dividing Range into Victoria. Erosion occurs under similar conditions in South Australia on the slopes of the Mount Lofty Ranges, and in Western Australia, in a narrow belt along the Great Southern Railway and in the northern part of the wheat belt adjacent to Mingenew and Geraldton.

There is a great deal of variation in the degree to which these areas, which are mainly included within Group A. on Map II., are affected; almost every paddock shows some variations from the next one according to differences in slope and management. There are also major regional differences according to soil and climatic conditions. The part played by management in the prevention of erosion is of the utmost importance. Much can be done by adopting methods of rotational cropping, thus avoiding long periods of bare fallow which greatly increase the risks of erosion.

Low prices for primary products, particularly for wheat, indicate the need of greater attention to mixed farming and stock-raising, associated with fodder crops and long-rotation pastures for stock. This is becoming more practicable with increased knowledge about the best methods of growing such plants as lucerne under dry conditions, and the most suitable varieties to use.

The nature of the rainfall also bears closely on the erosion risk. Probably there are pronounced regional differences in the frequency and intensity of heavy storms, and in the seasons at which they occur. In connection with erosion such facts are far more important than average rainfall figures and a study of them is necessary for the proper design of erosion-control works. At present there is almost a complete lack of scientific observation of these matters. The same is unfortunately true of studies of the extent to which different soils are susceptible to erosion, as most of the detailed soil surveys have been confined to areas of intensive agriculture under irrigation where erosion does not occur.

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*Compare map "General Distribution of Erosion," facing page 170 in, "A Report on National Planning," December 1, 1934, National Resources Board, U.S.A.

The general considerations affecting erosion in the wheat belt also apply to other farming areas on sloping land in the high-rainfall regions. Districts of this type are those which produce fodder crops on the coast of New South Wales, or peas and other market garden crops in the central tableland (for instance, near Oberon and Bathurst, New South Wales) and also the upland potato-growing districts of the southern States. Orchards are particularly susceptible because the bare, cultivated surface, maintained to control weeds and conserve soil moisture, offers little resistance to erosion during heavy rains. A score of districts can be mentioned where erosion has played a part in lowering production from orchards, and has in some cases caused farm abandonment. Some of these are in the citrus districts of Gosford (New South Wales) and the Blackall Range (Queensland); the cherry orchards of the Canobolas district, Orange (New South Wales), and Young (New South Wales); apple orchards of the central highlands (as near Bathurst, New South Wales); again further south near Batlow (New South Wales), and in Western Australia as at Donnybrook and Bridgetown.

If the damage could not be remedied, the outlook would indeed be gloomy, but methods of preventing and curing water erosion are known, thanks mainly to work done in other countries, notably the United States and South Africa. The main objects are to decrease the speed with which water runs off the ground, thus decreasing its erosive power, and at the same time to increase the proportion of the rainfall which soaks into the soil. The most common methods are to throw up contour banks across the land to control run-off, to change old methods of cultivation, and to use more pastures in the crop rotation.

Two factors condition the use of these methods. First, trained men must be available to advise and assist in the work, for some measures need technical skill not possessed by all men on the land. The second consideration is the cost involved in carrying out the necessary work, which causes greatest delay in the adoption of erosion control. Landowners are naturally slow to spend time and money on a matter which is causing perhaps only slight loss year by year, even though the loss is increasing. On the other hand, it has been shown that many control measures are well worth while, quite apart from the checking of further soil wastage; for example, in some cases the construction of contour banks on crop and pasture land has paid for itself in a few seasons by causing increased plant yields, largely because more rain has been absorbed into the soil instead of running away.

Wind erosion is most serious in those agricultural areas shown in group C on May II., although it also occurs within those of group D to a lesser degree. The areas most seriously affected are in the outer mallee of Victoria and in South Australia, with less important local examples in the south-west of New South Wales and the wheat belt of Western Australia. The erosion problem in some of these areas is bound up with an unfortunate economic history. They were opened up in prosperous times with optimism based on the deceptive rainfall records of a few years, and were developed with methods of settlement and agriculture transplated wholesale before their suitability to the new environment had been tested. As a result, mistakes were made in overcapitalization, in making farm areas too small, in clearing timber in a face from soils which proved highly susceptible to erosion, and in burning stubble and cultivating fallows in much the same way as had been done on areas with a heavier and more reliable rainfall. There followed, particularly in Victoria and South Australia, some of the most spectacular losses in Australia caused by erosion and sand-drift. The maintenance of the water channels, on which settlement in the Victorian mallee depends, has cost an average of £75,000 yearly during the last ten years. Including also the cost of clearing drift sand from railways and roads, the total cost to public authorities for this area is estimated at £120,000 annually, but this loss must be far smaller than the incalculable amount represented by the deterioration of tens of thousands of acres of agricultural land. Necessary adjustments of farming methods and of individual financial positions in order to combat erosion and low rainfall are being made. Whether farmers in these areas are able to build up sound, profitable livelihoods will depend, as much as anything, on the skill and care shown in combating soil erosion.

V.—The Problem in the Pastoral Areas.

The most seriously eroded pastoral areas are in the Western Division of New South Wales and in South Australia where the annual rainfall is low, decreasing from about 12 inches in the better parts to less than 5 inches near Lake Eyre. In the southern section there is a slight winter maximum, but generally the rainfall is irregular in its seasonal occurrence and in total amount. The vegetation shows considerable regional variation. The main feature is the presence of numerous edible trees and shrubs which, under original conditions, protected the soil against erosion, and now provide a fodder reserve for stock in dry times. The annual grasses and herbage species respond with amazing rapidity to the infrequent, heavy rains, but they vary greatly in bulk with seasonal conditions. Little of this region is regarded as having a carrying capacity higher than one sheep to 8 acres, while some of it is stocked as lightly as one sheep to 30 acres.

''Overstocking'' is described repeatedly as the first cause of soil erosion. It is certainly prevalent and is rightly to be condemned. Nearly all the area is owned by the States, and hitherto lessees have been practically uncontrolled in their stocking policy. Their errors of judgment or disregard for the land have been reflected in deterioration of State property. At the same time the administration in some States has failed to encourage conservative stocking by insisting on a high estimate of carrying capacity when fixing rents and when alloting additional areas to make up that unfortunate fiction ''a home maintenance area.'' It has been urged that in order to check overstocking on these Crown lands, the authorities administering them should have power to restrict the number of stock carried on any lease. This proposal has many practical difficulties which could be overcome only by experience, and it has been felt by many that the troubles which might result from faulty administration would be too great. It seems now, however, that conditions are so bad that some action is warranted. In New South Wales the representatives of pastoralists in the West Darling district have themselves requested some legislative regulation of stocking in order to control careless lessees.*

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*Report submitted to the Erosion Committee by the Pastoralists' Association of West Darling, at Broken Hill, New South Wales, on 27th April, 1936.

A Soil Conservation Committee in South Australia has commented that "because of the wanton carelessness of some pastoralists, control of some kind is required. There appears to be no reason why they (lessees) should have the right to destroy the pastures and soil-holding plants any more thant a tenant of a house has freedom to destroy the capital value of that property." The committee then recommends that "all new leases issued for pastoral purposes should be issued on the basis that leases may be cancelled if land is abused by mismanagement, particularly by overstocking. Restrictive stocking conditions should be inserted into leases of pastoral lands prescribing the maximum number of stock to be grazed" with the provision that "the number of stock may be increased if satisfactory evidence is submitted to the Pastoral Board that the land is capable of carrying more stock."

Such control, if administered efficiently, would make a great contribution towards checking erosion during minor dry spells or droughts. But the main problem goes further than checking what is generally spoken of as "overstocking." It depends on the most essential characteristic of the environment, the fact that severe droughts are to be expected about once in 10 years. The natural vegetation is marvellously adapted to withstand these droughts if not abused by excessive grazing. For example, bladder saltbush (*Atriplex vesicarium*), "the most important fodder bush in arid Australia," resists drought by several devices; an unusual chemical and physical make-up which enables it to store substances retaining moisture and to avoid living on its store of plant-food in droughts; a structure which allows it to absorb moisture through the leaves from a humid atmosphere; and a shallow root system which produces deciduous feeding roots only after rain.* The aboriginal human and animal populations had adapted themselves to a drought environment by following a nomadic existence. This is the ideal adjustment to drought conditions which are rarely continent-wide, but occur rather in patches. The wild animals, and the black men who hunted them, migrated to the best pastures and drought-stricken areas were left alone.

By contrast, pastoral settlement by white men involves immobile occupation. Capital is invested in fences, water improvements, and buildings, generally in expectation of annual returns. Practically all suitable land is occupied so that land for relief purposes is scarce and when it is in demand competition often pushes the price of agistment to undesirable levels. The result is that lessees endeavour to keep stock numbers fairly constant, and therein lies the weakness of the usual arguments about "overstocking." There must come the inevitable drought periods when even a property regarded as conservatively stocked under average conditions will be "overstocked"; it will probably hold out longer without suffering, but in the end a long drought produces much the same results throughout the region it covers. All grass and herbage disappear and the shrubs of the saltbush type are eaten back until they provide little protection to the soil. Then wind erosion causes damage which in many respects is quite irreparable. Not only are roots exposed and many shrubs and trees killed, but the seed-bed is damaged so that their regeneration is difficult. Plants which do reappear are frequently eaten out by stock and rabbits before making much growth, as has happened almost without exception to the mulga throughout South Australia and New South Wales.

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*"Regeneration of the Vegetation on the Koonamore Vegetation Reserve, 1926 to 1936," J. G. Wood, Transactions of the Royal Society of South Australia, Vol. IX., 1936.

On the return of seasons with high rainfall, the damage is masked for a time by the characteristic prolific growth of annual herbage and grasses. The tendency then is to think that all is well. But few people can make a reliable comparison of conditions extending back over two or three drought periods, and there is good reason to suspect that in each severe drought there is a progressive deterioration of the vegetation. In some pastoral areas this has been partly obscured by the fact that in each drought new bores and dams have been sunk to provide water so that parts could be utilised which had hitherto been practically unstocked and thus offered a reserve of relatively virgin pasture. But this is no longer possible in most areas and the real position is becoming more obvious.

These opinions suggest a problem more complex than can be fully met by restricted stocking. The most essential need is not altogether to keep down stock numbers continually, and prevent them from soaring in seasons of abundant feed, but to effect a complete removal of stock fairly early in an ''old man'' drought, when their continued presence means inevitable destruction to soil and vegetation. This presents a tremendous task in practice. There is the difficulty that when it is decided to shift the sheep, they may not be able to travel along stock routes which are notoriously abused and eroded throughout these areas and will probably have been eaten out already. Cheaper and more efficient motor transport is helping to solve this problem by making it possible to carry fodder and to handfeed travelling sheep and in some cases to transport the sheep themselves. There is the difficulty and expense of obtaining country within reasonable distance where sheep can be agisted. And there is always the possibility that after going to the expense of shifting sheep, the drought may break within a few weeks.

These problems can be faced most effectively by owners with big resources who can afford the high costs and risks of providing transport and agistment. In the most arid regions there is much to be said for large companies owning a number of widely scattered properties, one or more of which will usually have some surplus feed and be able to accommodate sheep from drought-stricken areas. There are cases where two or three graziers whose properties are some distance apart have arranged for an interchange of sheep on a co-operative basis according to local conditions. This type of adaptation is very desirable and well worth encouraging.

It is almost impossible for the settler on a ''home maintenance area'' to make an effective plan to save his property from deterioration in drought time and still make an adequate income. We have pointed out elsewhere that the idea of a ''home maintenance area'' is not applicable to these regions on economic grounds.* It is equally indefensible from the vital viewpoints of adjustment to drought and soil conservation. Nevertheless, in the Western Division of New South Wales ''home maintenance'' areas originally subdivided on too small a scale are being enlarged by taking land from the larger leases. The result is often that small holdings are still too small, while large holdings, previously in a position to make adjustments to meet the erosion problem, are being weakened. It must be realised that soil conservation is more vital to the national prosperity than the reduction of Western Division lessees by two or three hundred, for in the long run the number of men employed and the value of the production would probably be greater.

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*See ''Closer Settlement,'' Bank of New South Wales Circular, Vol. VII., No. 2.

There are two large pastoral regions subject to deterioration which have not been dealt with yet. They are the acacia scrublands of south-western Queensland and of Western Australia in the Murchison, Eastern Goldfields, and Gascoyne regions. The vegetation of these areas varies greatly, although they have one feature in common, the predominance of edible trees and bushes such as mulgas and other acacias which are commonly referred to as "topfeed." These scrublands are interspersed with small open plains with saltbush (*Atriplex* sp.) and bluebush (*Kochia* sp.) most common in Western Australia, and with grassy plains in the Queensland area. These open patches tend to be heavily grazed, especially in dry periods, and where the soils are of the typical reddish, loamy nature, wind erosion plays havoc. Along watercourses through the scrubs there are also signs of widespread water erosion caused by heavy storms coming when there is little cover on the ground.

More important, however, is the fate of the "top-feed." Because it is not so variable in seasonal amount as are grass and herbage, these regions developed a reputation for safety. But in recent very severe droughts, the "topfeed" has been eaten back as never before and the number of trees and shrubs greatly diminished. For years many of the trees have been lopped and even cut down to feed starving sheep. The scrubs have been further thinned out by the death of many trees through drought and other causes. Generally speaking there has not been sufficient thinning out of the scrub to cause much erosion, but there is some concern for the future, both from the erosion viewpoint and because of reduced carrying-capacity if the regeneration of mulgas and edible shrubs is not sufficient to replace fully those which have been lost. There are some regions where no young mulga trees whatever can be found, and in very few localities is the regeneration keeping pace with the destruction. There is no doubt that this is due to sheep and rabbits eating young seedling trees. Under favourable seasonal conditions mulga will re-establish itself if left unstocked for a few years, and much could be done by rotational spelling of paddocks, particularly if rabbits were kept down. It should be noted that there are areas in Western Australia where young mulgas are growing well on stocked country and it has been suggested that this is due to a resinous covering on the leaves of young mulgas making them unattractive to stock. This does not correspond with experience in the eastern States and it has yet to be established how much of the regeneration is of edible varieties and whether it is sufficient to give a prospect of continued stocking at past levels. More information is required on many aspects of the problem, for the present deterioration is too serious to go unchecked.

VI.—Plans for Soil Conservation.

The damage done by soil erosion has reached serious proportions and is progressing at a rate not recognised even by those most directly concerned. The most urgent need is that there should be exact, scientific observation of the conditions causing erosion and of its extent. It is essential to know the danger spots and the strength of the enemy before planning a campaign of control and prevention. In the preliminary skirmishes up to the present, valuable reconnaissance work has been done by committees, usually comprising officers of the government departments concerned with agriculture, Crown lands, forestry, irrigation, &c. But the time has now arrived for more detailed investigations which can be performed best by specialists. A few men engaged on this work in each State could, in very short time, cover the ground in sufficient detail for present requirements.

The next need is for properly equipped stations to investigate scientifically the technical problems connected with soil erosion control. This can probably be done best in agricultural areas by enlarging the equipment and activities of various government experimental farms. In the semi-arid pastoral areas there is need for many more research projects similar to the Koonamore Vegetation Reserve which is the only area where detailed observations have been made on our dry-land flora. At present there are not more than three men in Australia occupied mainly in research on water erosion. The only equipped scientific laboratory devoted entirely to studying soil erosion is pledged to work on dry-area problems, and these are the least susceptible to control by methods devised in a laboratory. Until research has been conducted with adequate facilities, the best that can be claimed is that methods recommended to men on the land are experiments, for they have been copied almost entirely from other countries and modified by intelligent guesswork to suit Australian conditions.

Once the control of erosion has been placed on a scientific basis there will be need for more active educational work. Provided there is a nucleous of specialists, this can be done most effectively by advisory officers of the agricultural departments who are in constant touch with men on the land.

Looked at in the broader sense there is need to regard the use of land in a more enlightened way than hitherto. Soil erosion is not an isolated feature related only to farming or pastoral practices on the particular spot where it occurs; it is intimately connected with every phase of land settlement. It is linked up with the size of a farm unit in relation to its economic and physical environment. In many cases its control would involve changes in property boundaries and other forms of co-operation between adjoining landholders where the management of one property causes an increase in soil erosion on another. There is also need for road and railway engineers to pay more attention to the influence of their works in accelerating erosion. In thousands of cases badly designed culverts have caused gullies to be eroded on adjacent farm land.

The clash of interests over the use of some regions must also be checked. Thus, in New South Wales there is the continual agitation to have parts of the small remaining forests thrown open for farming, regardless of the risk of erosion on the headwaters of important streams. The further creation of small holdings in dry regions strenuously advocated by some bodies of land seekers must also be discouraged because of the erosion risk. Erosion in the high mountain forestlands of Victoria is believed to have been hastened by graziers annually burning over the forest floor to encourage growth of grass, although foresters deplore this as harmful to the forests. This position is made still worse by the fact that these pastoral leases are on the catchment area of very expensive irrigation reservoirs where siltation might well become a serious matter. Simple experiments could establish beyond doubt whether the annual burning is harmful, and if so, the whole question of control of headwater catchments should be reviewed in an impartial manner.

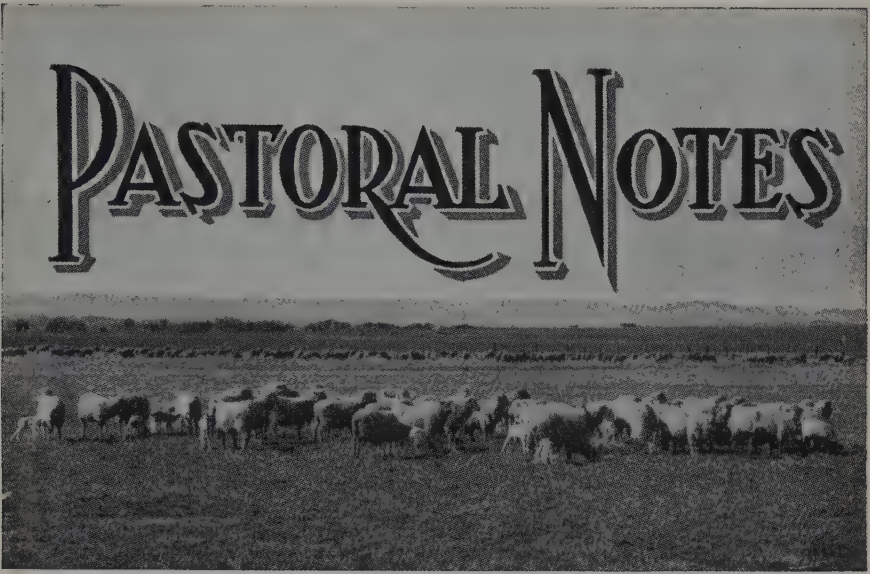
There is need for a changed attitude towards land, not only by men on the land, but also by the public as represented by government action. A changed mental outlook must be developed which, although following the methods of business farming, will not neglect so seriously the elementary principles of land husbandry; which will not look on indifferently while inches of soil are being washed from a fallowed paddock by heavy rains, or deep gullies are being cut in heavily stocked, treeless hillsides. The attitude that these things are inevitable and anyway will not cause great loss until after the interest of the present owner has ceased, must be changed.

Nor can the State ignore its responsibiity in helping to create conditions conducive to erosion by bad planning of settlement. For instance, when, in subdividing new wheat lands in the 'twenties, farm areas were made too small, excessive cropping was encouraged and soil erosion followed. Such mistakes are bound to occur in developing new areas before conditions are fully understood, but they would not be as frequent if soil conservation were considered sufficiently. Neither is the State entirely blameless of a charge often laid against landholders, that they take too much from the soil and put nothing back. Particularly in some States where land taxation and rents are excessive, more revenue should be devoted to research of value to the land and to subsidising control measures as is done in South Africa. The deterioration of land resources is a subject of great variety and complexity, wrapped up with the whole system of land utilisation. It is a problem which has evolved gradually to a stage where it must be faced methodically and thoroughly, and it must be made clear that no time should be wasted in grappling with this problem so fundamental to the common welfare.

[Photo.: Lands Dept.

Plate 169.

UTCHEE CREEK, NORTH QUEENSLAND, NEAR ITS SOURCE.—This scene is typical of the rich rain forest lands of Tropical Queensland, which are coming rapidly into production. Luscious pasture has taken the place of almost impenetrable jungle, and fertile, well-watered country like this contributes abundantly to the butter output of a great dairying State.



Pink-Eye in Sheep.

"PINK-EYE," or infectious ophthalmia, has been known for many years in Australia, and though the mortality is very slight, deaths may and do occur in drought or semi-drought areas where, because of blindness, sheep are unable to get to water.

A great deal of trouble follows outbreaks in travelling mobs of sheep or during mustering for shearing or any other purpose, for the disease is then very difficult to check.

Material from the infected eye of a sheep transferred to the healthy eye of another sheep reproduces the disease, and healthy sheep grazing on tall pasture (for instance, most seeding grasses) and running with infected sheep may also suffer. If, however, the grass is kept well cropped down, the liability to infection is considerably reduced. It is presumed, therefore, that in the field, "pink-eye" is not transmitted from sheep to sheep by direct contact, but by the material from the infected eyes being brushed off by the grasses or herbage, and thus conveyed to the eyes of healthy sheep. Flies also may spread the disease.

An attack of the disease appears to convey an immunity, but if only one eye of the sheep is affected, this is the only eye which possesses the immunity.

It is also known that exudate from the eye becomes non-infective after drying for a short period. Thus, in fine weather, healthy sheep can be turned into previously infected paddocks or driven over stock routes without risk twenty-four to forty-eight hours after infected sheep have been moved out of these places. There is also some evidence to show that any injury to the eyes through dust, grass seeds, or anything else, increases the liability to infection.

The symptoms can be divided into three stages which ordinarily follow one another, although it is quite common for the trouble to clear up at the second stage and not proceed to the final stage of ulceration.

The first stage is characterised by a discharge from one or both eyes, and on examination the membrane surrounding the eye is found to be inflamed and the eyelids swollen. These symptoms are followed by the second stage, in which the front of the eyeball becomes smoky or opaque. A scum is gradually formed through which small branching blood vessels may be seen and a varying amount of pus is present in the corner of the eye.

By this time the sheep is quite blind in the affected eye, and shows signs of acute pain, while the least sound will disturb the animal, causing it to rush blindly in any direction with its head held high, progress being stopped only by violent contact with a fence or some such object.

The third stage, which is not seen in all affected sheep, is one of ulcer formation in the front of the eye. Sometimes the ulcers appear to burst, and the eye becomes practically covered in pus.

Many cases, however, do not go as far as this, and even if left untreated the animal may recover with little or no loss of sight, although complete recovery probably takes a month or even longer.

As in many other diseases of sheep, treatment depends on the facilities for handling the sick animals. All affected sheep should be at once isolated and cut up into small hospital mobs held in small shady paddocks, handy to water, where they can be supervised easily.

A few drops of a 2½ per cent. solution of zinc sulphate in water, made by dissolving 1 oz. zinc sulphate in 1 quart of water, should be dropped into the affected eyes by means of a shearer's oilcan. All pus and other matter is wiped from the eyes with cotton wool soaked in this same solution.

This treatment should be carried out as frequently as possible, and usually the disease will clear up after about a week.

—*Ross Nott.*

IMPROVEMENTS ON THE SMALL SHEEP PROPERTY.

When money is available a small grazing selection frequently carries improvements fit for a much larger property. On the other hand, when money is scarce, the small holding often lacks even the bare improvements essential to the well-being of the sheep and the handling of the clip.

A property has a certain capital value, and unnecessary improvements merely means over-capitalisation. Interest has either to be paid or allowed for this excess expenditure.

Certain improvements are, however, essential in all cases.

A substantial boundary fence and, should the district be dingo-infested, netting and top netting are obviously necessary.

Next in importance is the water supply. Should there be adequate natural water the selector is fortunate. Failing natural water, wells, sub-artesian bores, surface tanks, or bore drains to conduct supplies from neighbouring bores must be provided. The type of watering facilities to be used is essentially a matter of economics. What pays best, particularly in drought emergencies, should be a guiding principle in the grazier's choice.

A horse paddock and yards for the handy working of house cows are among the first provisions to be made. This paddock should, of course, be handily situated to the homestead and should contain water.

Subdivisions of the property for the convenient working of sheep is seldom given sufficient thought. It involves not only the running of fence lines, but their construction in such a way that water is easily and continuously available to the stock. The fences should be substantially erected to obviate continuous drafting and boxing. Too much money may be spent in wrongly thought out subdivisions, but, generally, the smaller the paddocks the better. The posts used for fencing should be of timbers proved in the district for their durability.

The shearing shed and drafting yards may, on a small holding, be close together. The shed should be well constructed and properly designed, but not larger than necessary for the competent handling of the numbers of sheep ordinarily run on the property. The yards also should be constructed substantially, and their correct design for the drafting of sheep is of first importance. Where shed and yards are together, the latter should be so placed that the shed can be conveniently filled with woolly sheep.

The situation of the homestead should permit the easy working of the property, and its cost should be no greater than the improved value of the holding warrants.

—*J. Carew.*

DISINFECTION.

The object of disinfection is to destroy organisms and ultra-visible viruses which cause disease. It is a job which should certainly be done after the occurrence of one or more cases of contagious disease—such as tuberculosis, contagious abortion, swine fever, and influenza.

Periodical disinfection of stables, milking sheds, piggeries, and poultry runs is highly commendable as a measure of disease prevention.

The extent and thoroughness of the work would depend on the nature of the disease which had occurred, and would not need to be so extensive or intensive when merely carried out as a routine measure.

A common error in disinfecting premises is to first remove accumulations of excreta, discharges, dirt, and dust. Otherwise, the causal organisms and viruses contained in the accumulations are disseminated throughout the building, and may lodge in places which cannot be easily covered by the disinfecting solution afterwards.

The proper way is first to apply liberally to all parts of the premises a suitable disinfectant in solution, and to leave it in contact for twenty-four hours.

After the disinfectant has been allowed to act for that period, the walls and floors should be scraped (or scrubbed), and the scrapings soaked with kerosene and burnt.

Suitable solutions are phenol or other coal tar preparation (1 pint to 4 gallons water), chloride of lime (1 lb. to each gallon of water), or crude carbolic acid (1½ pints to 4 gallons water), to be sprayed on all surfaces.

If shearing sheds and yards are disinfected before shearing commences losses of stock through infection of wounds may be avoided.

IN THE LAMB-MARKING YARD.

Lamb-marking should be done under the most hygienic conditions possible. The work consists of castration and the insertion of the registered earmark on the off ear of ram lambs, and of marking similarly the near ear of ewe lambs. In addition, an age mark is frequently placed on the ear opposite the registered mark. Tails are removed from all lambs.

The ewes and lambs should be mustered and yarded the night before marking, thus avoiding operating when the lambs are in a heated condition, which leads to excessive bleeding.

All instruments should be cleaned and disinfected thoroughly. Earmarking pliers should be frequently dipped in a prepared disinfectant in the course of operations.

There are two recognised methods of castration—viz., slitting and tipping.

Slitting has its advantages in that it leaves the wether with a more pronounced cod. However, when flies are bad there is a greater tendency for the lamb to become flyblown. In tipping, the tip of the purse is entirely removed. Tipping is the better method of the two in the opinion of many sheepmen, as it leaves a cleaner wound with better drainage. The wound so made also heals more satisfactorily. Moreover, tipping is faster—a fact which counts when thousands of lambs have to be marked.

The best age at which to mark is from a fortnight to three weeks. A proved fly remedy, both curative and antiseptic, should be applied to all wounds. The use of old yards should be avoided if practicable.

—*J. L. Hodge.*

[*Photo.: Lands Dept.*

Plate 170.

A SCENE ON NEW-SETTLED DAIRY LANDS NEAR JAPOON, NORTH QUEENSLAND.—Note the vigorous growth of introduced grasses. Although the stumps and charred logs—all that is left of the original jungle cover—remain, a dense sward has been established.

The Dairy Farm

Inferior Grade Cream.

ONE of the most common sources of the contamination of cream, and one that is often overlooked, is the badly washed cream can.

More cream is spoilt by being stored or carried in a badly washed can than by most other ways. This applies to cans in good order as well as those that are dinted and rusty.

The reason is not far to seek. Hundreds of cans pass through the same rinsing water of the mechanical can-washer at the butter factory daily, and although a final steaming is carried out in the last stage of the washing process, it is not of sufficient duration (nor is it practicable) to sterilise thoroughly all of the cans thus treated.

It should be obvious that cans which have contained second-grade cream will require extra attention, in order to prevent the transmission of taints due to bacterial activity—such as cheesiness and rancidity—to the fresh supplies of cream.

A tallowy smell which is often found in returned cans may be due to inefficient washing, followed by exposure to the heat of the sun, causing deterioration of the fat.

It is, therefore, advisable in order to safeguard the quality of cream, to rinse all cans on their return from the butter factory with boiling hot water to which a little washing soda has been added. The cans should then be rinsed with clean boiling water to remove all traces of the soda.

The storage of the cleansed cans is important. They should be placed upside down on a suitable rack to allow for cooling and drying. On no account should anything but boiling water be used for the final rinsing, nor should any attempt be made to dry the cans with a cloth. The storage rack should be placed in such a position as to be well removed from any possibility of contamination from the stockyard.

—*C. L. Moran.*

IMPORTANCE OF STIRRING CREAM.

Some dairy farmers show by the cream which they send to a factory that they lack knowledge in regard to the care of cream on the farm. Clean methods in production may be nullified by the spoiling of good cream in the dairy.

As butterfat is the lightest constituent of cream it rises gradually to the top as soon as the cream enters the can. Therefore, in unstirred cream the lower layers, rich in separated milk—which contains a high proportion of casein, and consequently a low proportion of butterfat—are at the bottom. Changes in the separated milk due to bacteria are often such that when the cream reaches the factory it is graded down as sour and curdy.

A dry film on the top of the cream or layers of different colours and texture through the can tells the grader at once that the cream has not been stirred, and he is immediately impressed by the defects in it.

To keep a uinform consistency of cream and to ensure the best possible ripening conditions the cream should be cool before it is added to any existing supply. Regular stirring is then necessary to liberate accumulated gases and aerate the mass, which ensure uniform consistency. Aeration not only reduces the temperature of the cream, but also retards the growth of undesirable bacteria.

Stirring pays because no dairy farmer can afford to lose the difference in price between choice and lower grade creams on each consignment that he sends to the factory.

—*G. B. Galwey.*

WHAT IS A FAIR OVER-RUN?

Among dairy farmers the over-run paid out by butter factories is a perennial topic. A question asked frequently is: "What is the maximum over-run obtainable by a factory where all weighings, tests, and other operations are carried out correctly?" Here is the answer—

Over-run in Queensland is the excess butter actually manufactured over the amount of commercial butter (estimated from the approved chart) obtainable from all cream received at the factory. Butter of legal composition must contain at least 82 per cent. of fat, and to obtain the maximum over-run a factory must, therefore, convert every ounce of fat which it receives in the cream into butter containing exactly 82·0 per cent. of fat. Under commercial conditions this is impossible, as there is a proportion of the fat lost in various ways. There is a certain amount of cream spilt, or lost in other ways, during sampling, tipping, and processing; a further quantity of fat is lost in the buttermilk and, finally, there is a loss of butter in the packing process. The percentage of the total fat lost in these ways is approximately 0·2 per cent. in spillage, &c., 1 per cent. in the buttermilk, and 0·25 per cent. in packing—making a total fat loss of approximately 1·45 per cent. The effect of this loss is best illustrated by an example.

One thousand lb. of cream with a fat test of 40 would be paid for as 489 lb. of commercial butter. The actual quantity of fat in this weight of cream is 417 lb. A loss of 1·45 per cent. of this fat means that 6 lb. of fat is lost during handling and manufacture, leaving 411 lb. of fat which can be manufactured into butter. The maximum weight of butter of legal composition which can be manufactured from this quantity of fat is 500 lb., and the maximum over-run is therefore 11 lb. of butter on the estimated quantity of 489 lb.—equivalent to 2·25 per cent. It is not possible for a factory working under commercial conditions to consistently obtain this over-run, and it can be taken for granted that the over-run obtainable should be no higher than 2 per cent. A factory can only consistently exceed this figure by one or more of the following practices:—

(*a*) Cutting the weights of the cream.

(*b*) Cutting the fat tests.

(*c*) Manufacturing butter of illegal composition.

In the manufacture of unsalted butter, the over-run obtainable is considerably less than the figure given above. The maximum over-run obtainable on unsalted butter is 1 per cent., but under commercial conditions it is doubtful whether it could exceed 0·75 per cent. A factory which manufactures both salted and unsalted butter should, therefore, have a lower over-run than one which makes salted butter exclusively.

—*L. A. Burgess and O. St. J. Kent.*

DRY MILKING IS CLEAN MILKING.

Milking with hands which are moistened with milk at the beginning of and during milking is known as wet milking. Dry milking—which is used always by the cleanest and most efficient milkers—means commencing with clean, dry hands, which are kept as dry as possible during milking.

The method of milking with unwashed udders and teats and moistening the unwashed hands with milk is an objectionable and dirty habit and seriously contaminates the milk, as well as chapping the teats. To anyone who doubts this no further evidence is necessary than a glance at the accumulation between the fingers of a person who practises wet milking. In some countries where milkers' competitions are held at agricultural shows and elsewhere, deliberate wet milking disqualifies a competitor.

It should be remembered by the dairy farmer producing milk for city or town requirements that wet milking causes loss of keeping quality, a serious disadvantage in a warm climate.

It is often claimed that dry milking is difficult to anyone unaccustomed to it, and in attempting a more hygienic method, vaseline is used as a lubricant to make stripping easier and to help keep the teats soft and flexible. This is certainly to be preferred to careless wet milking, but if the teats are washed before starting to milk and the milker also washes and dries his hands frequently during milking—as required by the Dairy Regulations—both are generally sufficiently pliable and the use of vaseline should be unnecessary.

Injured or chapped teats should be protected during milking by placing round them a piece of cotton wool and afterwards applying a suitable ointment. The ointment hastens healing and softens the teats for the succeeding milking.

—*E. B. Rice.*

FEEDING OF CALVES.

About 87 per cent. of cows' milk is water. Of the remainder, nearly one-third is fat, and a good separator, if properly operated, will remove about 95 per cent of this fat. Very little protein is removed. It follows that, if the separated milk is to be made equal in feeding value to the original milk, either the fat or its equivalent must be replaced. There is no need to replace protein, and for this reason it is not good practice to feed such protein-rich materials as linseed meal in conjunction with skim milk to very young calves.

Dripping obtained from a reputable meatworks, or cod liver oil, may be incorporated in the milk, but they are rather expensive and difficult to mix properly. A better system is to use finely ground maize. Maize meal from good-quality grain contains as much as 5 per cent. high-grade oil and 70 per cent. of easily digested carbohydrate, which, to some extent, serves the same purpose as fat.

The new-born calf should get whole milk for a fortnight if it is to be given a good start in life. For the first few days it may be fed three times daily; after that, twice daily is enough. A safe level to feed is 1 gallon to each 100 lb. liveweight. At the end of the second week a little maize meal is stirred into the milk and the change to separated milk begun. By the end of the third week the maize meal may be built up to a handful, and the change to separated milk completed. By the end of a month the calf begins to nibble grass, and can consume about ½ lb. of meal.

From then on to the eighth week the milk can be replaced progressively by water and a meal mixture. By the eighth week the calf will be able to eat up to 2 lb. daily of a suitable meal mixture.

Such a mixture may contain 35 lb. of linseed meal and 65 lb. of a cereal meal. Pollard and bran should not constitute more than one-half of the cereal meal. The remainder may be crushed oats, barley, or maize. About ½ lb. of salt and 2 lb. of sterilised bone meal should be included in the mixture.

As the animals take more grass or hay, the supply of the meal mixture is restricted. At six months, unless an adverse period is encountered, the calf should be able to fend for itself.

◆

MEAT AND BLOOD MEALS FOR DAIRY CATTLE.

Meat meals and blood meals sold under a variety of names are rich in digestible protein. A high-class meat meal with a crude protein content of 65 per cent. has about twice the digestible protein of commercial cottonseed or linseed meal. In farming terms, this means that 1 lb. of high-grade meat meal has about the same feeding value as 2 lb. of linseed or cottonseed meal.

The cost of meat or blood meal is not greatly different from that of the vegetable meals, and if they can be conveniently included in the ration of dairy cattle feeding costs will be reduced.

Only dairy cattle which have been consistently underfed take kindly to meat or blood meals. Cattle which have been accustomed to small quantities of these meals from birth also present no difficulty.

As a general rule, however, dairy cattle only slowly acquire a liking for concentrates containing meat and blood meals and at first only a few ounces should be included in the regular ration. The amount can be gradually built up to the required level, which will, of course, depend upon the quality and quantity of other foods used. Advice on suitable rations may be obtained from the Department of Agriculture and Stock, but the dairy farmer can usually adjust the concentrates in the ration to conform with the milk yield of the individual cow.

Grain and molasses, grain and salt, milling by-products—such as bran and pollard or such attractive meals as linseed, cottonseed, or cocoanut—may be mixed with the meat and blood meals to attract unwilling cows.

Animals which still refuse to eat these meals may be kept for a short time without any food, other than that offered, if allowed plenty of water. It is important that the feed should be changed night and morning, so that a fresh mixture is always before the cow. If this system appears too drastic the nose-bag method may be used. Freshly-chaffed green maize and the meal are mixed before using, and the contents of the bag should be changed night and morning. Most cattle can be induced to eat meat or blood meals by one or other of these methods.

Both meat and blood meals should be fresh, free from objectionable odour, finely milled, and sterile. An undue greasiness is not detrimental, but, in general, the higher the fat content the less palatable the meal.

Meat meals should show a good analysis. Any preparation with a crude protein content of less than 50 per cent. is not a true meat meal, but a meat and bone meal. Blood meal should show a minimum of 75 per cent. crude protein. It should be almost without smell.

As both meals decompose when allowed to remain in a moist condition they should be stored in a dry place and any excess in the feed boxes should be removed each day. Material which has been "fouled" by moisture soon becomes a source of danger and is then only fit for fertilizing.

CLEANLINESS IN THE MILKING SHED.

Observations at milking time on some dairy farms reveal carelessness which is dangerous from a viewpoint of infection from bacteria. Bacteria in milk and cream are well-known causes of low-grade, inferior products, and safeguards against their introduction are essential.

The milking bucket should on no account be used as a washing utensil, either for the udder and teats of the cow or the milker's hands. The act of washing the udder transfers innumerable bacteria with the dirt and loose hair to the bucket, and a simple rinsing in cold water is not sufficient to remove them all. The need for separate milking buckets and washing buckets is therefore very obvious.

A bucket and cloths for washing the udders and a wash basin for washing the hands before milking each cow are hygienic necessities in the bails. The dairyman may well ask himself the question: "Would I take my meals with hands unwashed after completing milking operations?" The answer would be an emphatic "No!" Yet the cleanliness of his hands during milking is at least as important, for milk and cream are foods which may be easily contaminated.

Clean hands are just as essential during milking as at the dining table. It is therefore remarkable that many people who are scrupulously clean in the home are lamentably careless in the cowyard and dairy.

Another very common practice is the wiping of soiled, milky hands on the clothing. These same clothes, if worn throughout the day, soon acquire a most objectionable smell and attract flies. Sugar-bag aprons—which are easily made, inexpensive, and long-wearing—are suggested for use by all milkers. The aprons should, of course, be washed frequently.

The protection of milk against flies is also a matter of consideration. Most dairymen have in use a large, shallow milk vat, and this should be provided with a lid in which an opening has been left for the milk strainer, or, if milking machines are in use, for the releaser. This lid keeps out dust and vermin, and also is a help in maintaining the temperature of the milk before separating.

Hand milkers frequently moisten the cows' teats during milking from the milk in the bucket. This practice cannot be condemned too strongly, as the hands are usually soiled, and bacteria from the udder of the cow are transferred to the bucket.

The following points are all practised by the most successful dairymen:—

Wash the udders in buckets used only for that purpose.

Wash the hands after milking each cow.

Wipe the hands on a clean cloth, not on the clothes, and wear either an apron or overalls.

Aprons and overalls are easily boiled; so keep them clean.

Don't use an uncovered vat. Under the Dairy Regulations a cover for the vat *must* be provided.

—*E. C. Dunn.*

TO SUBSCRIBERS.

Subscribers to the Journal are asked to write their names legibly on their order forms. The best way is to print your surname and full christian names in block letters, so that there shall be no possibility of mistake.

When names are not written plainly it involves much tedious labour and loss of valuable time in checking electoral rolls, directories, and other references. This should be quite unnecessary.

Some subscribers write their surname only, and this lack of thought leads often to confusion, especially when there are other subscribers of the same surname in the same district.

Everything possible is done to ensure delivery of the Journal, and subscribers would help us greatly by observing the simple rule suggested, and thus reduce the risk of error in names and postal addresses to a minimum.

The PIG FARM

Live and Dressed Weight of Bacon Pigs.

THE loss of weight in transit of a pig from farm to factory and through the process of slaughter, dressing, and cooling varies with pigs at different weights. Generally, lighter weight, unfinished pigs shrink more than heavier weight, prime conditioned stock.

Factors which affect the amount of loss are the size and weight of the pig; the way in which the pig has been fed and "finished"; the weather, distance from farm to factory; conformation and condition of the pig; and the amount of food eaten before the pig is weighed alive. There also are variations in animal individuality; for instance, some pigs are of a nervous, excitable disposition, and fret, while others are more contented and are unaffected by the journey.

In extensive tests it has been shown that under conditions similar to those ordinarily ruling in Queensland, pigs weighing 150 lb. to 200 lb. alive on the farm lose about 10 per cent. of this weight in actual transit to the factory, and then another 20 per cent. in dressing and cooling off. Lighter pigs, weighing 100 lb. to 140 lb. alive on farm, usually lose approximately 33 per cent. by the time they are dressed and cooled off. While these figures are possibly a fair average, individual pigs varied considerably.

On the sale of about 1,000 bacon pigs from experiments conducted conjointly by the Departments of Agriculture and Stock and Public Instruction in Queensland, results were as follows:—

All pigs were weighed after a 12-hour fast at the sty. They also were weighed at the factory before slaughter not more than 24 hours afterwards and were weighed again in the usual way at the factory after slaughter. The average loss from live weight on the farm to actual cold dressed weight at a factory was 30·5 per cent., varying from 25 per cent. to 34 per cent., with heavier losses on lighter weight stock marketed slightly unfinished for purpose of comparison.

These deductions may be accepted as a guide to the general average of factory deductions in Queensland.

—*E. J. Shelton.*

BEFORE WINTER COMES IN THE PIGGERY.

Before winter comes, some preparations should be made to ensure comfortable quarters for the pigs on the farm. Although in Queensland the stock may not use the shelters for a long period, when they do have need of cover it should be ready for them.

First of all, the drainage from the piggery should be inspected. After the wet season the drains are often silted up, and pools may have been turned into deep, foul wallows. The drains should be cleared, and the wallows drained and filled in. This will prevent water from lying in the yards after winter rains. Wet, sloppy yards in the winter time make the pigs uncomfortable, and consequently more or less unthrifty. In addition, the discomfort to the men who have to carry on routine feeding, &c., in the piggery is of some importance.

Where the sheds and feeding troughs are movable, they should be shifted to a fresh site. If the sheds and troughs are fixed, any holes or wallows against them should be filled. Then the sheds themselves should be inspected for cracks in the lower walls and floor. Any such cracks should be closed to prevent draughts, which are liable to cause rheumatic and muscular disorders in the pigs. Guard rails should be examined in the farrowing sheds, and all troughs cleaned and examined for necessary repairs.

At the end of summer there is usually a quantity of rank grass growing. If cut and stacked, this will be useful as bedding for winter litters.

Fences in a piggery generally need some attention during the year, and while the other work is being carried out it is advisable to inspect the fences for loose wires and posts, and to fill in holes made by pigs trying to root under the fence lines.

Where foods are boiled for pigs, it is a good plan to examine the fireplace and boiler and ensure that it will not be necessary to make repairs during the winter months when the boiler will be in daily use.

Although much of this labour may appear unnecessary, the farmer who understands animal management will realise that, apart from the fact that equipment is receiving an overhaul, the work is being done with one main object—to ensure the comfort of the stock. Where pigs are kept under comfortable conditions they generally prove more economical growers than those which are neglected, for the contented pig is a quicker grower and usually requires less feed per 1 lb. gain in live weight. Thus, for his own benefit, the pig-raiser should make sound preparations for the winter months.

—*T. Abell.*

THE FARROWING SOW.

While "in pig" the sow should be given as much freedom as possible, for activity promotes health and good digestion, to the advantage of the sow and its prospective litter.

Her food should not be stinted, but she should be kept in moderate condition. Sows which are too fat at farrowing will probably have trouble in delivery, and may also suffer from many other troubles, of which milk fever is only one. On the other hand, if the sow is kept too short of food she cannot nourish the young pigs properly while carrying them, nor can she suckle them properly when born.

At the time of farrowing a close watch should be kept by the usual attendant—strangers upset the sow—who should not interfere unless there is evidence of trouble in parturition or the sow attempts to bite her young. This sometimes happens when some of the pigs remain to be born and one of those already dropped tries to get to the teats; especially if it squeals, the sow—usually a young one—will seize the piglet in her mouth and quickly squeeze the life out of it. Should she break the skin and taste blood, she may turn on the rest of the litter and eat them. The attendant can prevent this by taking each piglet as it is dropped and putting it aside in a straw-lined box until all are born, when they may be put on to the teats and all will be well.

For the first two weeks after farrowing the sow does not require more food than she received during the last two weeks of pregnancy, but after this the supply should be gradually increased as she requires it.

There is nothing commoner than deficiency diseases in young pigs caused by the absence of the requisite amount of mineral matter in the food. Mineral matter is contained in fish meal, while cod liver oil, with its essential vitamins, stands pre-eminent as a constituent in the food of young pigs. One teaspoonful of cod liver oil twice a day is sufficient for pigs up to ten weeks old.

Draughts, dampness, and uncleanliness, as well as unsuitable food for the mother, will cause scouring, which may lead to death.

Given reasonable care and attention, no trouble should arise, and this little extra care means the difference between a strong, healthy litter and a few stunted, unthrifty runts.

—*W. Dixon.*

[*Photo.: Lands Dept.*

Plate 171.

The New Range Road, near Koumala, Mackay District, Central Queensland.

Registered Hatcheries

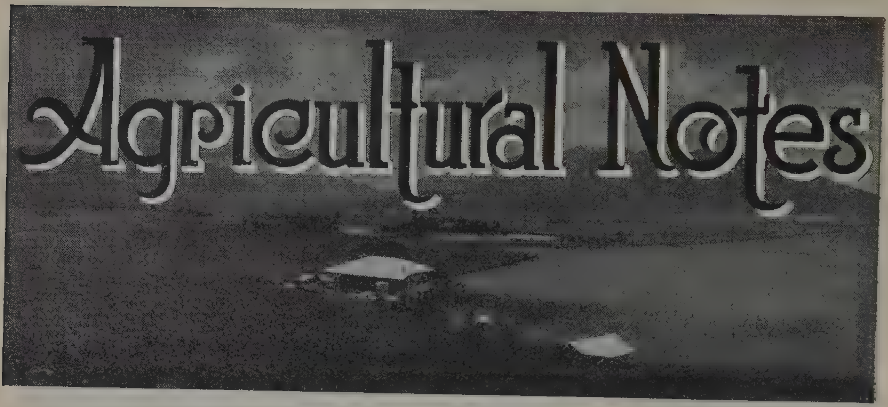
Name and Address.	Name of Hatchery.	Breeds Kept.
G. Adler, Tinana	Nevertire	White Leghorns, Australorps, Rhode Island Reds, and Langshans
F. J. Akers, Eight Mile Plains	Elmsdale	White Leghorns and Australorps
E. J. Blake, Rosewood	Sunnyville	White Leghorns, Australorps, White Wyandottes and Rhode Island Reds
J. Cameron, Oxley Central	Cameron's	Australorps and White Leghorns
M. H. Campbell, Albany Creek, Aspley	Mahaca Poultry Farm and Hatchery	White Leghorns and Australorps
J. L. Carrick & Son, Manly road, Tingalpa	Craigard	White Leghorns
N. Cooper, Zillmere road, Zillmere	Graceville	White Leghorns
R. B. Corbett, Woombye	Labrena	White Leghorns and Australorps
T. G. Crawford, Stratford	Rho-Isled	Rhode Island Reds
Rev. E. Eckert, Head street, Laidley	Laidley	Australorps, White Leghorns, and Langshans
Elks & Sudlow, Beerwah	Woodlands	Australorps and White Leghorns
W. H. Gibson, Manly road, Tingalpa	Gibson's	White Leghorns and Australorps
Gisler Bros., Wynnum	Gisler Bros.	White Leghorns
J. W. Grice, Loch Lomond	Quarrington	White Leghorns
C. & C. E. Gustafson, Tannymorel	Bellevue	Australorps, White Leghorns, and Rhode Island Reds
J. McCulloch, Whites road, Manly	Hindes Stud Poultry Farm	White Leghorns, Australorps, and Brown Leghorns
A. Malvine, junr., The Gap, Ashgrove	Alva	White Leghorns and Australorps
H. L. Marshall, Kenmore	Stonehenge	White Leghorns and Australorps
W. J. Martin, Pullenvale	Pennington	Australorps, White Leghorns, and Langshans
J. A. Miller, Racecourse road, Charters Towers	Hillview	White Leghorns
F. S. Morrison, Kenmore	Dunglass	Australorps, Brown Leghorns, and White Leghorns
Mrs. H. I. Mottram, Ibis avenue, Deagon	Kenwood Electric Hatcheries	White Leghorns
J. W. Moule, Kureen	Kureen	White Leghorns and Australorps

Name and Address.	Name of Hatchery.	Breeds Kept.
S. V. Norup, Beaudesert Road, Cooper's Plains	Norup's ..	White Leghorns and Australorps
E. K. Pennefather, Oxley Central	..	Australorps and White Leghorns
G. Pitt, Box 132, Bundaberg ..	Pitt's Poultry Breeding Farm	White Leghorns, Australorps, Langshans, Rhode Island Reds, and Brown Leghorns
C. L. Schlencker, Handford road, Zillmere	Windyridge ..	White Leghorns
A. Smith, Beerwah	Endcliffe ..	White Leghorns and Australorps
T. Smith, Isis Junction	Fairview ..	White Leghorns and Langshans
H. A. Springall, Progress street, Tingalpa	Springfield ..	White Leghorns
W. J. B. Tonkin, Parkhurst, North Rockhampton	Tonkin's Poultry Farm	White Leghorns and Australorps
T. Westerman, Handford road, Zillmere	Zillmere ..	Australorps and White Leghorns
P. A. Wright, Laidley ..	Chillowdeane ..	Brown Leghorns, White Leghorns and Australorps
R. H. Young, Box 18, P.O., Babinda	Reg. Young's ..	White Leghorns, Brown Leghorns and Australorps

NEW REGISTRATIONS.

Following is a list of those who have applied for the registration of their hatcheries up to the 24th March, 1939:—

Name and Address.	Name of Hatchery.	Breeds Kept.
J. Caspaney, Kalamia Estate, Ayr	Evlington ..	White Leghorns
Dr. W. Crosse, Musgrave road, Sunnybank	Brundholme ..	White Leghorns, Australorps, and Rhode Island Reds
Dixon Bros., Wondecla ..	Dixon Bros. ..	White Leghorns
W. J. B. Foxwell, Coomera ..	Foxwell's	White Leghorns and Australorps
G. Grice, Loch Lomond, via Warwick	Kiama ..	White Leghorns
Mrs. M. Grillmeier, Mount View, Milman	Mountainview	Australorps
P. Haseman, Stanley terrace, Taringa	Black and White	Australorps and White Leghorns
C. Hodges, Kuraby	Kuraby ..	Anconas and Leghorns
D. J. Murphy, Marmor ..	Ferndale ..	White Leghorns, Brown Leghorns, Australorps, Silver Campines, and Light Sussex
H. W. & C. E. E. Olsen, Marmor	Squaredeal Poultry Farm	White Leghorns, Australorps, Black Leghorns, Brown Leghorns, and Anconas
A. C. Pearce, Marlborough ..	Marlborough Stud Poultry Farm	Australorps, Rhode Island Reds, Light Sussex, White Wyandottes, Langshans, Khaki Campbell and Indian Runner Ducks, and Bronzewing Turkeys
J. Richards, Atherton	Mount View Poultry Farm	White Leghorns and Australorps
A. J. Teitzel, West street, Aitkenville, Townsville	Teitzel's ..	White Leghorns
W. A. Watson, Box 365, P.O., Cairns	Hillview ..	White Leghorns
G. A. C. Weaver, Herberton road, Atherton	Weaver's Stud Poultry Farm	Wyandottes, Indian Game, Barred Rocks, Australorps, White Leghorns, Anconas, Rhode Island Reds, Buff Orpingtons, Black Orpingtons, and Buff Leghorns.



The Trench Silo.

LARGE quantities of suitable fodders—comprising maize, sorghums, panicum, lucerne, and useful native grass and herbage mixtures on cleared pasture areas—are growing at present in many districts. That interest is being taken by more farmers in the conservation of the season's abundance is shown by the number of pit silos being constructed for the storage of the summer fodder surplus. There also is, however, some evidence of apparent apathy in respect of the establishment of fodder reserves. As much of this material has now reached the prime stage, the best way to conserve it would be to place it in a trench silo, and the attention of dairy farmers is directed towards this cheap and effective method of storage.

A few important points in the construction, method of filling, and emptying of the trench is briefly given for the benefit of interested farmers.

Select a reasonably level and well-drained site as near the place of feeding as conveniently possible. Mark it out according to the capacity required. A trench 30 feet in length, 8 feet wide at bottom, 12 feet at top, and 8 feet deep, having an outslope at each end of 1 in 3 grade, would hold approximately 45 tons. By altering the length and retaining the other measurements, the capacity may be increased a ton for each additional foot length.

To construct the trench, excavate according to the desired dimensions, using plough and scoop and depositing the spoil along either side to back up the logs, which should be placed lengthwise to raise the walls 2 feet above the surface. Complete the job by trimming the walls smooth with mattock and spade.

The cost of construction involves labour only, and the time taken would vary according to the nature of the ground. In ordinary circumstances, two men equipped with suitable plant should excavate a trench of 45-ton capacity in about two or three days.

In filling the trench silo there is no necessity to chaff the material, full-length crops being loaded in the field and drawn through the trench, off tipped, and spread in even layers lengthwise, the empty vehicle passing out the other end. Thus each layer is consolidated as a result of the trampling of the horses' action throughout the whole filling process.

Should the crop be at all dry through over-maturity or as a result of frost, a sprinkling of water may be added during the filling process. The filling should continue well above the surface, forming a parapet of about 3 feet high, sloped towards the sides of the trench.

Complete the filling by covering it with grass well watered, finally topping with a 9-inch to a 12-inch layer of earth.

The material so stored will be fit to use as silage in from two to three months after filling, if so desired, or it may be safely stored for many years without undue deterioration or loss.

To remove the silage for use, the trench should be opened up at one end, taking the earth and grass covering from a portion only as required, and cutting down vertically with a sharp implement, such as a spade or hay knife. When a complete face section from top to bottom has been removed, an adze may be used to slice off additional material in a semi-chaffed or short-chopped form, resulting in its being in a more acceptable condition for feeding direct to stock without further preparation.

The silage may be fed as it is to practically all classes of stock. For cows in full milk, however, better results are obtained by the addition of a small quantity of protein-rich fodder and concentrate—such as lucerne chaff and cotton-seed meal.

Further particulars about silos and silage may be obtained on application to the Under Secretary, Department of Agriculture and Stock, Brisbane.

—*W. H. Bechtel.*

ONION-GROWING.

As onion sowings are usually made in April and May, the incidence of the rainfall received during the winter months is of the utmost importance, and, when deficient, has to be supplemented by irrigation. Because of its deep-rooting habit, the onion can withstand limited dry spells, but the best results are obtained where the growing period is fairly moist, with drier conditions towards maturity and during harvest.

Rich, well-drained, sandy loams, friable and easy to work, have proved the most suitable, producing onions of good appearance and better keeping qualities than where grown on heavier soil types. Sandy soils tend to produce bulbs of good size but low keeping quality, while heavy soils will induce thickened or bull-necked plants.

The preparation of land intended for onion cultivation will now be nearing completion, and it must be remembered that deep cultivation should be avoided as the sowing period approaches.

The seed may be broadcast in seed-beds from which the plants are transplanted to their permanent positions in the field. Alternatively the seed may be sown in the permanent drills. The latter method is usually adopted in Queensland, utilising the "Planet Junior" type of hand seeder, and placing the seed in drills 12 inches to 15 inches apart, which will be found to call for 2 lb. to 3 lb. per acre. The seed should only be lightly covered with not more than ½ inch of soil, as deeper sowings germinate very poorly.

When the young plants are 4 inches to 5 inches high they are thinned out to a distance of 4 inches to 6 inches in between plants, a practice usually carried out with the aid of a 2-inch chipping hoe.

In the southern districts sowings may be commenced soon and continued until May, while in the central and northern districts the period can be extended to July. If sown too early, losses may result from flowering, while if too late the bulbs may be small owing to insufficient time in which to mature before the hot weather causes scalding. Sow late-maturing varieties early and early-maturing varieties late. Only freshly-grown, tested seed should be utilised, as onion seed deteriorates rapidly, and it is therefore preferable to buy seed from reliable sources.

The Brown Spanish type, including "Early Hunter River Brown Spanish," is the most popular, the onions being of good appearance and flavour and possessing good keeping qualities.

The hand cultivators of the "Planet Junior" type are useful for inter-row cultivation, as all weed growth must be kept in check. The soil should not be thrown up against the bulbs, the object being to draw the soil away rather than towards the plants, thus inducing the formation of bulbs. If the soil is not drawn away, bending over the tops with a twisting motion will assist in the formation of bulbs. When the seed-bed has been thoroughly prepared it will be found that very little hand weeding is necessary.

SOWING OF WINTER PASTURES.

Many farmers will soon be preparing land for sowing winter pastures to provide grazing during winter and spring. The sowing of winter pastures should be done during late March or in April. Later sowings will be successful only if exceptionally good seasonal conditions are experienced subsequent to sowing. Annual winter pastures, which are being sown for the sole purpose of providing feed during the present year, must go in early if a long grazing season is to be obtained.

If through dry weather, or some other circumstances, the preparation of land intended for winter pastures has not been done thoroughly, and a fine seed-bed is not available, the sowing of permanent winter pastures is not recommended. Instead, an annual pasture should be laid down, and after the land has been ploughed in the summer the area should be well worked for autumn sowing with a permanent pasture mixture in 1939.

Winter pastures should be sown only on land of at least fairly good fertility. If success is to be achieved with valuable grasses—such as *Phalaris tuberosa*, perennial ryegrass, Italian ryegrass, and prairie grass—it is essential that the soil should be of good quality. Land not quite up to first-class standard may support Wimmera ryegrass and cocksfoot pastures, but infertile and roughly prepared land cannot be expected to maintain a good winter pasture. Cultivation areas which have been "cropped out" should not be put straight down to winter pasture, as is often done, but should have their lost fertility restored to some extent by green manuring.

The winter-growing pasture plants available for use include perennial species—such as *Phalaris tuberosa,* perennial ryegrass, cocksfoot, red clover, white clover, and lucerne, and annual species, including Italian ryegrass, Wimmera ryegrass, prairie ryegrass, and Berseem clover. Not all of these plants are, of course, suited to all districts, but recommendations regarding suitable mixtures for most localities in the southern dairying and agricultural districts are available on application to the Department of Agriculture and Stock.

—*C. W. Winders.*

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CLOVERS ON THE COAST.

A marked increase in milk production in late winter and spring when white clover is plentiful in the pastures is a common experience in coastal dairying districts. Unfortunately, it is not every year that weather conditions are favourable for the development of a good growth of clover in unimproved paspalum pastures.

Generally, the requirements of clovers are a fertile and not too acid soil and a fair supply of soil moisture. Where white clover is naturally abundant in paspalum pastures it may be taken for granted that its requirements are supplied, but it is true that the production of thousands of acres of paspalum pasture could be improved by the encouragement of clover growth.

Soils which are distinctly acid can only be made suitable for clover growth by the use of lime. If the fertility of the soil has been lowered by many years of grazing, it is advisable either to renovate with the plough or paspalum renovator and topdress with fertilizers. On suitable areas it may be preferable to plough out the pasture and grow a green manure or some other form of crop prior to resowing the area with a mixture of grass and clover seeds. Renovation and green-manuring practices, in addition to increasing soil fertility, also tend to increase the water-retaining properties of the soil.

In all cases where pasture has been renovated, or where new permanent pastures are to be sown, it is advisable to add clover seed to the pasture. The clovers which have proven themselves of outstanding usefulness for incorporation in permanent pastures are white clover and red clover, and both should be included in permanent pasture sowings on the sub-tropical coast. White clover provides good grazing from about August until November, while red clover makes the bulk of its growth from September till March. Compared with white clover, red clover is a short-lived plant and dies out in a pasture within two or three years. It is of great use, however, in providing feed during the first year while the white clover is establishing itself.

When sowing on renovated paspalum or in new pasture mixtures, about 1 lb. per acre of each of the clovers should be used. New Zealand strains of white clover are superior to European or local strains of which commercial seed is available; the best seed to use is New Zealand Government-certified white clover seed. New Zealand strains of red clover also are preferable to other commercial types.

—*C. W. Winders.*

UTILISATION OF SWAMP LANDS.

Throughout a considerable stretch of the northern coastal country swampy areas of lesser or greater extent are encountered, particularly in the wetter regions where dairying is now being developed. These lands, to a large extent lying idle, could, at no great cost, be utilised by planting them with para grass. This grass is easy to establish, because of its habit of rooting freely at the nodes. It is a rather coarse, vigorous grower, but has succulent stems and leaves and gives a large quantity of green material per acre. Under favourable conditions, yields of over 30 tons per acre have been obtained in one year. It is easily cut back by frost, and is, therefore, most suitable for the warmer localities.

This grass grows well in swampy localities, the runners going out even into deep water. Once established, it holds its own with any other grass. It has a further advantage in that it is credited with completely drying out marsh lands.

Para grass is usually propagated by runners, which root readily. These runners can be easily planted in furrows about 3 feet apart and about the same distance between the rows.

—*T. G. Graham.*

CEMENTED BAGS FOR LIGHT FARM BUILDINGS.

The ubiquitous chaff and cement bag can be turned to good account in the building of fowl houses or similar farm buildings of light construction, according to the following plan, which has proved successful in practice.

A framework of timber is first of all built up, after which wheat or cement bags are opened out and stretched very tightly over it, being nailed down with ⅝-inch clout tacks. Next, a mixture is made up as follows:—

Water, 1¼ gallons,
Cement, 12 lb.,
Lime 2 lb.,
Salt, 1 lb.,
Alum, ½ lb.

(In damp wet weather use 1 pint less of water.)

Sieve the salt and lime together through a fine sieve—to thoroughly mix the materials and get rid of any big lumps—add the water and then the cement—stirring while adding—and finally the alum. Wet the stretched bags with water and apply the mixture without delay, using a fairly stiff brush, first on the outside, and then on the inside. Before the mixture sets, but after the initial wetness disappears, apply a second coat to the outside. When this sets, the bags will be quite hard and stiff, somewhat like plaster board. Subsequent coatings will, of course, make a stronger board.

The cost of the process, including bags for the foundations, works out at about 8d. a square yard. From this it will be seen that it is a very cheap and easy method of construction. Sheds built according to this plan three years ago show no signs of disintegration.

—*H. W. Ball.*

Horticultural
Notes

The Spraying of Early Beans.

BECAUSE of the high prices recently obtained for vegetables, bean growers on the North Coast are planting exceptionally early this season, and, with the use of the nicotine sulphate-white oil spray, they hope to control the bean fly sufficiently to ensure the production of satisfactory crops. Prior to the use of this spray, plantings right up to May in other years often succumbed or the yields were markedly affected because of bean fly attack.

In using the spray at present, growers must not overlook the fact that the life cycle of the bean fly is shortened somewhat in this warmer weather. Consequently, instead of the two sprayings earlier suggested—that is, the first to be applied when the plants are four days old and the second four days later—it would be advisable to make the first spraying three days after the first beans have appeared and the second four days later, followed by at least two extra sprayings at four-day intervals. This procedure should be adopted for crops planted while the warm weather continues, that is, until the cooler weather retards bean fly activity.

Up to five and six sprayings have been applied in some cases, but recommendations involving this number of sprayings cannot at present be made, pending the completion of experimental work. Growers, therefore, will have to be guided by the number of flies apparent on the plants and the growing conditions. If warmth and moisture are plentiful the plants may survive a certain amount of bean fly attack and still produce good crops. If conditions are dry, however, the plants usually show the effects of the fly very quickly. The spraying programme will, therefore, probably need to be adjusted to the general conditions.

The formula of the spray is as follows:—One fluid ounce of nicotine sulphate, 8 fluid ounces of white oil, 5 gallons of water. For growers with large areas a larger quantity of spray may be prepared from the following ingredients:—Half-pint nicotine sulphate, 4 pints white oil, 50 gallons water.

—*J. R. Horsley.*

TOMATO GROWING IN CENTRAL QUEENSLAND—A REMINDER.

Widespread rains have stimulated preparations for an early planting-out of seedlings. Many growers will, in all probability, look to nurseries for supplies, but the majority will raise their own plants.

If seedlings are sought from outside sources, they should be obtained from reliable growers offering varieties true to type and free from crop-reducing pests and diseases. Correct attention to the seed-bed is of paramount importance in the production of strong, healthy plants. Hygienic practices in the seed-bed will greatly assist in reducing losses from diseases and pests.

When preparing the seed-bed, select a small area of newly-burnt virgin scrub land on which no lantana had previously grown. Level or slightly sloping ground is preferable. Oblong beds only wide enough to permit the grower to reach to the centre without undue exertion are advisable. They should be dug to the depth of an ordinary garden fork, and raised about 4 inches above the natural surface of the ground to ensure drainage. The soil in the beds should be reduced to a fine tilth and the surface levelled and firmed with the back of a spade before sowing the seed. When seed has been evenly and not too thickly scattered over the beds, cover lightly with fine soil. Treatment of seed with a solution of corrosive sublimate before sowing is a desirable practice. Information on seed treatment methods may be had on application to the Department of Agriculture and Stock.

To assist even germination of seed, the bed may be lightly covered with dry grass or hessian. Should hot sunshine prevail after the young seedlings appear, remove the covering from immediately above them to a higher level on a framework made with light forked sticks and cross-pieces.

Harden the developing plants, so that they can withstand conditions in the field, by gradually reducing the grass or hessian covering until they are fully exposed to the sun for a short period before transplanting. Frequent watering of the seed-bed to maintain an even and ample soil moisture condition is essential. During the time the young plants are growing in the seed-bed they should be sprayed and dusted as a safeguard against pests and diseases. A 2-3-40 formula of Bordeaux spray mixture is recommended as a control of tomato plant diseases in seedlings. The chief seedling pest is the tomato mite, for which dusting with a good grade of dusting sulphur is recommended. The sulphur may be conveniently applied with a dust gun or by shaking it over the seedlings from a sugar-bag or some similar container which allows the dust to filter through the mesh.

When plants have grown to a height of 6 or 7 inches, they are ready for transferring to their permanent location in the field. In removing plants from the seed-bed, care should be exercised to ensure the minimum amount of damage to root hairs during the operation. A thorough wetting of seed-beds before removing plants will greatly assist in reducing undue disturbance of the root system.

A convenient tray for the transport of seedlings from the seed-bed to the field can be made with a shallow box and by affixing two small uprights and nailing a cross-piece between them at the top to serve as a handle. Such a tray will protect plants against damage during transplanting operations.

Sowing seed directly into permanent positions within the field has advantages where irrigation can be practised or where good soil moisture conditions obtain, but it is not a recommended practice for the Central district, because of the unreliability and erratic nature of the rainfall.

—*W. J. Ross.*

SUCKERING IN THE BANANA PLANTATION.

A flush growth of young suckers may appear in most banana areas after heavy summer rains.

Before they form their own root system, these suckers rely solely on the parent plant for their subsistence, and where a number are present they retard the parent plant's growth and the development of its bunch of fruit.

Most growers have a definite time for suckering in their working plan, but others fit in at any time, if at all, with the result that four six, eight, and up to a dozen suckers, ranging in size from "peepers" to fully-grown plants, are seen, *all* of which have robbed the parent plant of some of its vigour.

Even in the most fertile soils the number of suckers left to bear the grower's next bunch should seldom be more than two, and sometimes three. It is desirable, therefore—particularly if a fertilizing programme is carried out—to destroy *all* the suckers which are not required as soon as they peep above the ground. At this stage they are easy to disconnect with little damage to the plant, and the fertilizer applied goes *only* to those suckers which will eventually produce the next cutting of bananas.

—*J. R. Horsley.*

MARKETING CAULIFLOWERS.

Cutting.—There should be no difficulty in marketing cauliflowers to the best advantage. The main stalk is cut a short distance below the base of the leaf stalks. This short length of stalk gives protection and prevents the leaves from breaking away. All first quality cauliflowers should be marketed with the leaves intact, as this prevents the heart from being damaged in transit.

Containers.—A clean chaff sack is the best container, being light and airy. Corn sacks, unless new, are usually unsuitable.

Packing.—The cauliflowers should be packed with the leaves brought together to protect the heart. This assists in preventing bruising and discoloration, keeping the heart white and attractive and in a fit condition to sell at high values.

Grading.—First and second quality cauliflowers should be packed separately. Each bag should contain as near as possible cauliflowers of the same size and quality. Mixed sizes do not sell as well as graded. Any cauliflowers showing leaf damage should be packed as second grade.

Branding.—Where possible, markings should be placed on the bags before filling. Stencils suitable for doing this are easily procured, and save time. The grower's name, or mark, and the number of cauliflowers in the bag should be conspicuously placed on the side of the bag. This makes identification easy, and often saves unnecessary handling.

Packed bags should not be used as a seat when carting cauliflowers.

—*J. H. Gregory.*

The Fruit Market.

J. H. GREGORY, Instructor in Fruit Packing.

ALMOST a month's continuous rain has brought about a great change in the country's prospects. Future supplies of quality fruit are assured from all districts.

Apples are now in full supply for good-quality, well-matured lines. Prices have been maintained at satisfactory levels.

Pineapples have been in full factory supply. A disquieting feature of the pineapple industry is the marked tendency of many growers to rush extra consignments on to the Southern fresh fruit markets when a rise in price takes place. Regularity of consignments (plus quality) is the keynote of successful marketing.

Custard apples are now in good supply. Growers are warned against marketing immature fruit, as it will not ripen and depresses the market.

The banana market should maintain itself at payable levels, as the supply of good-quality fruit has been somewhat reduced as a result of the prolonged dry period before the coming of the rains.

The following were the ruling market prices during the last week of the month of March, 1939:—

TROPICAL FRUITS.

Bananas.

Brisbane.—Cavendish: Small, 7s. to 10s.; sixes, 7s. to 14s.; sevens, 7s. to 16s. 6d.; eights, 12s. 6d. to 17s.; nines, to 18s.

Sydney.—Cavendish: Sixes, 14s. to 17s.; sevens, 17s. to 19s.; eights and nines, 19s. to 22s.

Melbourne.—Cavendish: Sixes, 15s. to 18s.; sevens, 17s. to 18s.; eights and nines, 18s. to 22s.

Brisbane.—Lady's Finger: 2½d. to 7d. dozen.

Brisbane.—Sugars: 4½d. to 6d. dozen.

Pineapples.

Brisbane.—Smoothleaf, 3s. to 6s. 6d. case, 1s. to 4s. 6d. dozen; Ripley, 5s. to 9s. case, 1s. to 5s. per dozen.

Sydney.—4s. to 8s.

Melbourne.—8s. to 12s.; Specials higher.

Care should be taken in selecting fruit for the South, highly coloured lines not being suitable for long-distance transport.

Papaws.

Brisbane.—Yarwun, 7s. to 9s a tropical case; Locals, 2s. to 5s. a bushel case.

Sydney.—6s. to 12s. a tropical case.

Custard Apples.

Brisbane.—3s. to 5s. half bushel.

Sydney.—7s. to 10s. half bushel.

Melbourne.—8s. to 10s. half bushel.

Avocados.

Brisbane.—Some small lines of avocados have come on the market and sold at satisfactory prices. Growers of this fruit must keep all immature fruit off the market to avoid retarding the development of the trade.

CITRUS FRUITS.

Oranges.

Brisbane.—Commons: Howard, 10s. to 14s.; Navels: Gayndah, 14s. to 16s., Howard, 12s. to 15s.; Californian Sunkist Navels, 35s. to 36s. export box.

Grapefruit.

Brisbane.—8s. to 11s. bushel.

Sydney.—Queensland, 10s. to 15s.

Melbourne.—12s. to 16s.

Lemons.

Brisbane.—Local, 5s. to 10s.; Gayndah, 10s. to 14s.; Byrnestown Specials, 18s. to 20s.

Sydney.—Queensland, 12s. to 16s.

DECIDUOUS FRUITS.

Apples.

Brisbane.—Jonathan, 7s. to 11s.; Granny Smith, 8s. to 9s., Specials higher; Delicious, 7s. to 10s.

Pears.

Brisbane.—Keiffer, 6s.; Howells, 7s. to 9s.; Winter Cole, 9s. to 11s.; Beurre de Caps, 5s. to 8s.; Williams, 9s. to 10s.; Packham, 7s. to 9s.

Plums.

Brisbane.—Grand Duke,, 6s. to 7s. 6d.; President, 5s. to 8s.

Figs.

Brisbane.—2s. to 2s. 6d. tray.

OTHER FRUITS.

Grapes.

Brisbane.—Muscats, 6s. to 8s.; Purple Cornichons, 7s. to 10s.; Colmans, 4s. to 6s.; Waltham Cross, 6s. to 9s.

Tomatoes.

Brisbane.—Ripe, 2s. 6d.; Green, 2s. to 5s.; Coloured, 3s. to 8s.

Sydney.—3s. to 5s.; Specials to 6s.

Passion Fruit.

Brisbane.—First Grade, 13s. to 18s.; Seconds, 10s. to 12s.

Sydney.—8s. to 16s. half bushel.

MISCELLANEOUS, VEGETABLES, &c.

Rockmelons.—3s. to 4s. case.

Cucumbers.—3s. to 4s. bushel case.

Pumpkins.—5s. to 7s. bag.

Marrows.—1s. to 4s. dozen.

Lettuce.—1s. to 3s. per dozen.

Cabbages.—Stanthorpe, 5s. to 8s. chaff bag; Locals. 2s. to 7s. dozen.

Beans.—2s. to 3s. sugar bag.

Peas.—7s. to 8s. sugar bag; second quality lower.

Beetroot.—6d. to 1s. bundle.

Carrots.—3d. to 1s. dozen.

PRODUCTION RECORDING.

List of cows and heifers officially tested by Officers of the Department of Agriculture and Stock which have qualified for entry into the Advanced Register of the Herd Books of the Australian Illawarra Shorthorn Society and the Jersey Cattle Society, production charts for which were compiled during the month of February, 1939 (273 days unless otherwise stated).

Name of Cow.	Owner.	Milk Production. Lb.	Butter Fat. Lb.	Sire.
AUSTRALIAN ILLAWARRA SHORTHORNS.				
MATURE COW (STANDARD 350 LB.).				
Alfa Vale Eveline	W. H. Thompson, Alfa Vale, Nanango	14,322·65	646·946	Reward of Fairfield
Sunnyside Empress 27th	P. Moore, Wooroolin	10,332·8	382·393	Emblem of Sunnyside
Lynfield Sally	F. E. Birt, Lynfield, Sexton	8,516·85	354·26	Lavender's Pride of Blacklands
Cedargrove Irene 20th	J. Redhead, junr., Indooroopilly	9,551·25	350·227	Duke of Cedargrove
SENIOR, 3 YEARS (STANDARD 290 LB.).				
Alfa Vale Lovely 7th	W. H. Thompson, Alfa Vale, Nanango	12,286·7	469·8	Reward of Fairfield
Pilton View Duchess	P. D. Fiechtner, Pilton View, Greenmount	9,149·0	394·552	Venus' Sheik of Navillus
Pilton View Rosebud	P. D. Fiechtner, Pilton View, Greenmount	9,280·3	373·805	Navillus Venus' Shiek
Springleigh Mavis 2nd	H. F. Moller, Springleigh, Boonah	9,528·0	365·793	Springleigh Bruce
SENIOR, 2 YEARS (STANDARD 250 LB.).				
Happy Valley Silky	R. R. Radel, Coalstoun Lakes	7,904·2	292·626	Burradale Emperor
Werona Vale Mayflower 10th	A. H. E. Black, Kumbia	7,544·26	285·899	Blueboy of Glenthorn
Pilton View Melba	P. D. Fiechtner, Pilton View, Greenmount	6,702·4	277·437	Navillus Venus' Shiek
Laguna Empress	F. G. Lamkin, Kaimkillenbun, Dalby	6,823·6	273·441	Morden Marcus
JUNIOR, 2 YEARS (STANDARD 230 LB.).				
Highfields Perfect 5th	J. A. Heading, Highfields, Murgon	6,398·4	329·895	Greyleigh Legend
Rhodesview Bumper 12th	W. Gierke and Sons, Helidon	6,273·27	265·082	Blacklands Prospector
Sunnyview Fairy Fly 2nd	N. L. Siemon, Beaudesert	6,266·6	253·069	Burradale Byron

JERSEY.

Mature Cow (Standard 350 Lb.).

Woodlands Pansy 3rd	W. E. Lewty, Leyburn	8,317·25	476·136	Carnation Golden Duke
Brooklands Royal Cherry	W. and C. E. Tudor, Branch Creek, Gayndah	8,637·78	417·478	Retford Earl Victor
Fern's Surprize of Inverlaw	R. J. Crawford, Inverlaw, Kingaroy	8,484·31	373·174	Montrose Gipsy of Glen Iris

Senior, 3 Years (Standard 290 Lb.).

Stoneleigh Comet's Pride (270 days)	W. and C. E. Tudor, Branch Creek, Gayndah	6,664·14	317·952	Brookland's Comet

Senior, 2 Years (Standard 250 Lb.)

Lady Evelyn of Windsor	E. J. and H. G. Johnson, Gleneagle	8,432·66	425·556	Bobs of Wingate
Hawthorn Brae Lady Colleen	P. Kerlin, Killarney	5,887·9	292·92	Hawthorn Brae Navigator

Junior, 2 Years (Standard 230 Lb.).

Bellgarth Buttercup 4th	D. R. Hutton, Cunningham	5,968·33	319·246	Trecarne Renown 2nd
Carnation Golden Bell	Geo. Harley, Childers	5,654·57	286·835	Vinchelez Golden Victory
Broadview Princess	W. S. Kirby, Byrnestown	4,673·6	237·518	Glenview Mason
Pineview Fawny	J. Hunter and Sons, Borallon	4,492·32	232·48	Oxford Fawn's Lad

General Notes

Mr. Bulcock's Overseas Mission.

Following is an extract from an editorial in THE QUEENSLAND PRODUCER:—

Possesssing as he does an amazing capacity for hard work combined with exceptional administrative ability, Mr. Bulcock has stood up to the exacting test with flying colours. Having regard to the fact that no previous Minister has held such a long unbroken record in control of this important department, and that he was recently re-elected for the seventh time President of the Council of Agriculture and chairman of the executive committee, the achievement is certainly one to be proud of.

Nominally he is supposed to enjoy a period of relaxation from his arduous tasks while abroad, but according to the programme he has mapped out and the investigations he intends to make in South Africa, the Argentine, and the United States, we are inclined to think that Mr. Bulcock will find his tour more in the nature of a ''busman's holiday.''

That the Minister has earned the esteem and gratitude of the vast majority of producers has been clearly demonstrated by the eulogistic terms in which his ability was referred to by speakers at the dinner of the dairying industry to wish Mr. Bulcock bon voyage and safe return.

While there have been times when certain sections of producers were unable to see eye to eye with his Ministerial policy, the fact remains that Mr. Bulcock's sincerity of purpose and desire to bring about an improvement in their conditions has never been in question. His sympathy for and understanding of the producers' problems, and never-failing assistance and active co-operation in trying to evolve practical solutions, have been a real source of encouragement.

On first taking over the control of the Department of Agriculture and Stock, he created the impression that technical matters were his main preoccupation. In due course, however, Mr. Bulcock turned his attention to the study of economic trends adversely affecting the returns of farmers, fruitgrowers, and graziers, and as a direct result the administration of the department has become more evenly balanced and helpful.

This tendency to emphasise the value of science as applied to agriculture and stock-raising, was perhaps the outcome of Mr. Bulcock's early training. Born on an irrigation farm in Victoria, and having studied agriculture at the Wagga Experiment Farm, it was quite natural that he sought to raise the standard of efficiency of his officers and through them that of the producers. It may be claimed that success has attended his efforts in both directions, but for a time serious doubts were entertained whether the policy did not lean too heavily on science instead of the practical side.

Be that as it may, agricultural economics in relation to production and marketing receive to-day from Mr. Bulcock the full consideration that this vital factor warrants, and as a consequence he is regarded with greater confidence by the man on the land.

In all the circumstances, therefore, he is well equipped to carry out his important investigations in three countries. The information Mr. Bulcock will be able to glean concerning both technical and economic problems, and the contacts he will make with research workers, economists, and administrators during the course of his tour, are certain to prove of inestimable value to our producers and to Queensland when he comes back and takes over his Ministerial duties again.

We heartily wish Mr. Bulcock God speed, happy hunting for information in his travels, and a safe return invigorated in health and knowledge.

Deputy for Acting Director of Marketing on Dairy Products Stabilisation Board.

An Order in Council has been issued under the Dairy Products Stabilisation Acts amending an Order in Council constituting the Dairy Products Stabilisation Board to provide that a deputy for the Acting Director of Marketing on such Board may be appointed by the Minister.

Staff Changes and Appointments.

Mr. V. Kleinschmidt (Hidden Vale, Grandchester) has been appointed an inspector under the Diseases in Stock Acts, the Slaughtering Act, and the Dairy Produce Acts, Department of Agriculture and Stock.

Mr. R. Walsh, Field Assistant, Biloela, has been appointed an inspector under the Diseases in Plants Acts, Department of Agriculture and Stock.

Messrs. H. C. Macartney (Yeppoon) and R. L. Hunter (Freshwater, via Cairns) have been appointed honorary protectors under the Fauna Protection Act. The latter also has been appointed honorary ranger under the Native Plants Protection Act.

Constable F. R. West (Roma) has been appointed an inspector under the Brands Acts.

The following inspectors of stock, slaughter-houses, and dairies in the Department of Agriculture and Stock have been appointed also inspectors under the Brands Acts:—Messrs. J. J. Purcell, V. J. Brimblecombe, C. N. E. Barr, T. W. Murray, J. E. Mahar, W. Williamson, C. L. Mudd, P. McCallum, and A. E. Mitchell.

Mr. V. J. Anderson, Court House, Childers, has been appointed chairman of the Isis Local Sugar Cane Prices Board and also an agent of the Central Sugar Cane Prices Board.

The following transfers of officers in the Department of Agriculture and Stock have been approved:—

Mr. A. F. H. D. Singh, Inspector of Stock, Slaughtering, and Dairies, from Chinchilla to Willowburn Bacon Factory;

Mr. J. J. Purcell, Inspector of Stock, Slaughtering, and Dairies, from Zillmere Bacon Factory to Chinchilla; and

Mr. E. J. Taylor, Inspector of Stock, Slaughtering, and Dairies, from the Willowburn Bacon Factory to the Zillmere Bacon Factory.

The resignation of Mr. L. A. Downey, Instructor in Pig Raising in the Department of Agriculture and Stock, has been accepted as from the 24th March. Mr. Downey resigned his position consequent on his appointment as Pig Expert in the Victorian Department of Agriculture.

Mr. J. Byron, cotton grader, Department of Agriculture and Stock, has been transferred from Brisbane to the Glenmore Ginnery, Rockhampton.

The following transfers of inspectors under the Diseases in Stock Acts, the Slaughtering Act, and the Dairy Produce Acts, Department of Agriculture and Stock, have been approved:—Messrs. J. P. Dowling, from Kingaroy to Dalby; J. Wyvill, from Wondai to Kingaroy; and T. W. Murray, from Oxley Bacon Factory to Wondai.

Mr. W. Eastgate, of Juliet street, Mackay, has been appointed an honorary protector under the Fauna Protection Act.

Other fauna protectors appointed in an honorary capacity under the abovementioned Act are—Messrs. J. K. McConnel, Mount Brisbane, Esk; G. Sheil and B. E. Shaw, Somerset Dam, via Esk; W. W. Williams, Union Bank Chambers, Creek street, city; D. Macdonald, M.L.A., Peachester; Inigo Jones, Crohamhurst Observatory, Peachester; T. Davies, Jimna Mills; D. P. Kennedy, Kilcoy; and P. Copley, Stanley House, Crossdale, via Esk. The abovementioned have been appointed in connection with the sanctuary for the protection of fauna, recently established, which embraces the Stanley River catchment and Mr. J. K. McConnel's property at Mount Brisbane.

Mr. W. G. Hancock, inspector under the Diseases in Plants Acts and agent under the Banana Industry Protection Act, has been transferred from South Johnstone to Woodford.

Constables K. H. Bateson (Georgetown) and S. McKinnon (Almaden) have been appointed also inspectors under the Slaughtering Act.

Mr. W. F. Rose (Bald Hills) has been appointed an honorary protector under the Fauna Protection Act.

Open Season for Duck.

An Order in Council has been issued under "*The Fauna Protection Act of 1937*" providing for an open season for wild duck in Southern Queensland from the 6th April, 1939, to the 31st August, 1939, both inclusive.

The area in respect of which the season will be opened is approximately that portion of the State south of the 25th parallel of south latitude.

The attention of shooters is drawn to an Order in Council which prescribes that twenty (20) wild ducks is the maximum number which any one person may take during a period of twenty-four hours.

Answers to Correspondents

BOTANY.

Replies selected from the outgoing mail of Mr. W. D. Francis, Botanist.

"Byfield Fern."

T.W.H. (Brisbane)—

The specimen from Mallanganee, is *Bowenia serrulata*, sometimes called "Byfield fern." It is not, however, a fern, but a cycad. It is extensively used as a table decoration. Plants should be obtainable from Byfield.

Devil's Fig.

D. (Yeerongpilly)—

The plant is devil's fig, *Solanum torvum*. The Solanums as a group are mostly regarded as suspected poisonous plants, although it is quite true that no deaths have been associated with the fruit of the common wild tobacco (*Solanum auriculatum*). On occasions, the devil's fig has been suspected of poisoning stock. It is possible that this might be the cause of the trouble.

Colocynth.

J.C. (Brisbane)—

The specimen from Muckadilla, is *Citrullus Colocynthis*, the colocynth. It belongs to the melon and cucumber family. It is a native of Africa, and has ran out in some parts of Western Queensland. The fruit is reputed to be poisonous in large quantities. The dried pulp of the fruit is used in pharmacy and has a strongly purgative action.

Barnyard Millet.

A.C.V.B. (Brookstead)—

The specimen is the barnyard millet, *Echinochloa colona*. This is a nutritious and palatable grass, which does well on the Downs. It makes particularly luxuriant growth in damp situations. It is a native species.

A Common Tropical Shrub.

J.T.M. (Mackay)—

The specimen belongs to a common tropical leguminous shrub or small tree, known botanically as *Leucaena glauca*. This plant has a good reputation as a fodder for stock, except that horses which feed on it are reported at times to lose the hair from their manes and tails.

A Snapdragon. Button Weed.

W.A.K. (Clermont)—

The specimens you send have been determined as—

1. *Morgania floribunda*, a plant belonging to the snapdragon family (Scrophulariaceae).
2. *Centipeda orbicularis*, button weed.

Neither is known to be poisonous or harmful to stock. We presume the specimen referred to as "fine mint weed" is No. 1. It is not allied to the mint weed.

Water Couch.

W.S.R. (Cooroy)—

The specimen is water couch, *Paspalum distichum*, an excellent fodder grass, both palatable and nutritious. It grows best on low lands, but in places is a bad weed in cultivation. We have no chemical data as to its content of protein, but judging by its effect on stock it appears to be quite as nutritious as paspalum or Rhodes grass. We recommend it to be planted on any low-lying country which is not used regularly for the cultivation of crops.

A Cultivated Plant (Phyllanthus nivosus).

Inquirer (Yeerongpilly)—

The specimen is a cultivated plant, *Phyllanthus nivosus* var. *roseo-pictus*, a native of the South Sea Islands. We have no record of its being poisonous to stock, although it belongs to the family Euphorbiaceae, which contains some virulent poison plants, such as the castor-oil plant.

Rural Topics

A Word for the Horse.

We have so often yarned about cattle, sheep, and pigs and other farm stock that we seem to have forgotten the horse, which, after all, is an important partner in the farming business. What do we think of our horses, anyhow? Are they pieces of machinery, like the plough or the mower, or do we regard them as real friends. A horse likes to be talked to, and though he may not know what it is all about, he certainly does understand the tone of voice, and if treated as a friend he learns to look for his boss and shows pleasure when he comes into the yard. We all know that whinny of recognition—ask any Digger who worked horses during the war! A lump of sugar, an apple, or a carrot given with a pat on the neck will make the day brighter for the horse. The ''Old Brig's'' (a famous Australian Light Horse leader) command at the end of a march—''Make much of your horses!'' was based on a wise army custom. In terms of money, at even a minimum wage, every horse easily earns enough during his best working days to maintain him in leisurely comfort in his old age. It is not, therefore, just sloppy sentiment to urge that an old horse should never be sold or given away to someone who may treat him badly. It is merely giving a horse a fair deal to turn him out on to a well-grassed paddock when his useful days are over; that, or a painless death when to prolong his life would mean nothing but misery and slow starvation to one of the best of man's dumb friends.

Soil or Dust?

According to Canadian experience, one of the chief causes of soil drift through wind erosion is a too-fine tilth in summer fallows. Among other remedial measures, one recommended by the Canadian authorities is the use of the one-way disc for cultivation, so that a rougher and more cloddy surface results.

The Necessity of Keeping Farm Records.

A farm manager is at the helm of a real business, in which physical effort is not enough to make things go. There must be thought and planning behind every move. There must be records which will show at the end of the year which farm operations have paid, and which have been carried on at a loss. With records as a guide, it is possible to avoid making the same mistakes a second time.—*New Zealand Farmer.*

The Hum of the Busy Bee—A Word for Every Wiggle.

Scientists have just discovered that bees don't hum with the buzz of their wings, but with the movements of their bodies. According to the bee specialist at the University of California—Dr. J. E. Eckert—there's a word for every wiggle. Most of the body movements performed in the air, and from which the ''hum'' or buzz is derived, tell other bees where to locate a new supply of food.

The Erosion Problem.

Here is a picture presented at the annual conference of citrus growers in Victoria—a picture not overpainted, and which represents, in part at least, similar conditions in other parts of the Commonwealth:—

> ''The ruthless clearing of timber from hillsides, and indiscriminate burning-off by settlers and others, is gradually bringing about an intolerable position. It costs the Victorian Water Commission £60,000 a year to cope with sand drifts in the Mallee and Wimmera. This is only part of the bill; the cost to the State in damaged watersheds and in ruined farming land is incalculable. Much of the damage should never have occurred. It was caused mostly by stupid—I hope that term is not too strong—handling of the land, by denudation by removal of natural cover, by indiscriminate cropping and by overstocking. The remedy naturally lies with the landholders themselves.''

Grooming of Dairy Cattle.

Grooming of dairy cattle is a refinement in farm management, which calls for consideration. High producing animals are usually kept on high-priced farms, from which natural scratching or rubbing-posts—trees or stumps—have been cleared. Frequent milking and stall feeding prevent during much of the day the natural function of self licking. Both these small inhibitions have an effect on milk production and it has been observed that, under these conditions, some grooming is decidedly beneficial.

Farm Notes

MAY.

WHEN seasonal conditions permit, the May sowing of wheat is recommended in the Maranoa and Central districts, where such early sown crops invariably outyield those established later in the season.

For the main Downs sowing, June is preferred unless sheep are available to check the early growth, as the principal varieties now grown, Flora, Florence, Pusa, Three Seas, Seafoam, and Glugas, are all sufficiently early maturing for early sowings to risk damage by frost. All seed wheat should be graded and treated with copper carbonate or a reliable mercury dust as a preventative of ball smut, utilising 1 to 2 oz. per bushel. Seed barley and oats are preferably treated with formalin, or with either of the mercury dusts Agrosan and Ceresan.

Succession sowings of oats, barley, or wheat required for grazing purposes can be made during the month, mixing field pea seed or tares therewith, as described in previous issues of this Journal.

Winter grasses should now be well established, but if previous sowing has been postponed owing to dry weather, land now in good condition may still be sown with suitable types, preferably *Phalaris tuberosa*, Wimmera Rye, or Prairie Grass, all of which will withstand fairly dry conditions. Sowings later than May are certainly not advised.

Lucerne sowings can be continued, drilling the seed to a shallow depth only, on soil containing sufficient moisture to induce satisfactory germination. Rolling is beneficial if the surface is somewhat loose and rough, but should be followed by a light harrowing.

Potatoes will have received their final cultivation and hilling, so that cultivators can now be diverted to the root crops such as mangolds and swede turnips established for pig-feeding purposes.

The sowing of onion seed may be continued on suitable soils, drilling in permanent position, in rows spaced from 12 to 15 inches apart, and lightly covering with not more than ½ inch of soil. Hand seeders are useful for this work if the areas are not extensive.

Mature sweet potatoes may be dug, allowed to dry in the sun for a few hours, and if desired for home use placed in dry sand until required. Sweet potatoes are mature when the cut surface dries white and does not turn greenish black round the edge.

Attention should be given to the important work of seed selection for future sowings before finalising the harvesting of maize, sorghum, sudan grass, cowpea, pumpkin, &c., as it is wise to be sure of varietal purity rather than depend on the seedsman from year to year.

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PRINCIPLES OF BOTANY FOR QUEENSLAND FARMERS.

A new book containing a fund of useful information about Queensland trees and shrubs, and of practical utility to the man on the land.

Price, 2s., Post Free.

Obtainable from—
The Under Secretary,
Department of Agriculture and Stock,
BRISBANE.

Orchard Notes

MAY.

SUCCESS in fruitgrowing depends not only on the proper working and management of the orchard, but also on the way in which fruit is handled and marketed. With citrus fruits particularly, none pay better for extra care in packing and presentation.

Some growers do not realise how easily the skin of citrus fruits is injured, especially that of fruit grown under moist and humid conditions.

In order to prevent injuring the skin when gathering, all fruit should be cut and not pulled. Any fruit that falls or is injured in any way should be rejected, as it is not fit to send to a distant market. If, however, the injury is only slight, it can be sent to a local market for quick sale.

For oversea and interstate markets, only choice fruit should be selected. It should be graded for size, colour, and quality, and properly packed, only one grade of fruit being packed in a case.

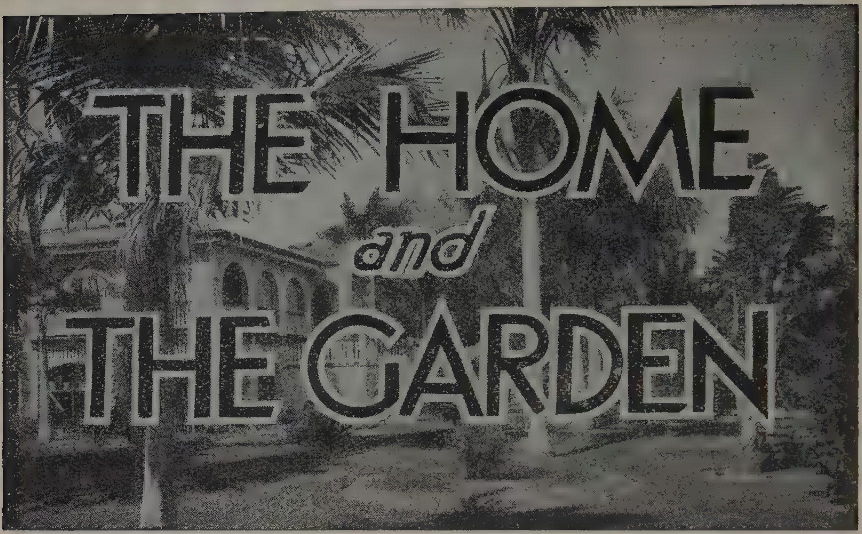
All orchards, vineyards, and plantations not thoroughly clean should receive immediate attention.

Banana and pineapple plantations should be put into good order, and kept free from weed growth.

Land to be planted with fruit trees should be got ready, as, if possible, it is always advisable to allow newly-cleared land to "sweeten" before planting.

Plate 172.

Stacey's Creek, near Ballandean, Stanthorpe District, South Queensland.



Our Babies.

Under this heading a series of short articles, by the Medical and Nursing Staffs of the Queensland Baby Clinics, dealing with the care and general welfare of babies has been planned in the hope of maintaining their health, increasing their happiness, and decreasing the number of avoidable deaths.

THE ONLY CHILD.

IN giving advice about the management of the only child for application in the home, we need to consider whether that home is in the city, small town, or isolated in the "outback."

There are two main points that parents should remember first; that all educationists and psychologists, who differ on many points, agree on one, namely, that character is formed before six years of age. After that, training and environment still count, of course, but not to the same extent. The second point refers especially to the only child, or one leading the life of the only child, and is that man is a social being.

Companionship with children of his own age or, better still, of his own stage of development is a necessary part of a child's life. Without it he has little opportunity of learning to make adjustments and is apt to become "a spoilt child." By adjustment is meant the process of learning how to fit harmoniously into a group of children, how to give and take for the good of the group, the process of acquiring judgment, balance, and control. In the light of future citizenship it means that the young child is learning to co-operate, to work for the good of the whole social group or community. He is gradually learning to put into practice the universal law of interdependence: interdependence of one individual upon another, of one part of the community upon another, of one nation upon another. Every intelligent teacher and parent has this in mind when training the baby or older child.

The best solution of the problem of the care of the child leading the life of an only child in the city is to send him to a nursery school or kindergarten. The trained director in charge is qualified to handle intelligently and sympathetically the various types of children who come under her supervision—the so-called difficult or problem child, the child over-attached to his mother, the irritable and emotionally unstable child, and others. The mother with a selfish and mistaken type of affection who is afraid to trust her child to the care of anyone but herself will be gratified to observe the improvement in her child after he has attended such a school. The child becomes more content as the result of his new interest, his emotional life is able to develop along healthy channels in his new environment, and his intellectual growth can take pace normally. To the onlooker it may seem that all the activity that goes on at the nursery school and kindergarten is just play. Behind it all growth and development are proceeding. Characters are being formed. The process is slow but sure. Attention is paid to the physical as well as the mental development. A sound mind in a sound body is the motto of the kindergarten.

There may be no nursery school or kindergarten in the town in which you live. In this case, social development being most important for your child, it may be possible to invite some children in to play. You can exercise supervision unostentatiously. If you are able to play just a little with them or show an interest in their play, or tell them a story, or read some nursery rhymes to them, how they will love you! Perfect English is not maintained under normal circumstances anywhere while children are young and imitative. Mistakes in grammar, even ''swearing,'' appear for short intervals in all well-conducted homes and schools; children love to imitate anything new.

For the parents of a solitary child in the ''outback'' there is often only one solution of the problem—the mother or guardian must give up much time, at the cost of some other duties, to give the child companionship. But the companionship must aim at strengthening, not weakening, the child. Let all games, all ''jobs,'' all enjoyments, keep as near a fifty-fifty basis as possible. Train the child to be a ''good loser.'' Develop responsibility by letting him keep pets and have entire control of their welfare. For mental culture, good books with clear pictures are essential. Handwork, be it connected with small house duties, carpentry, drawing, or other activities, is useful in helping to keep the only child practical. Aim always at turning his thoughts outwards, away from himself. Any creative work should be steadily encouraged; finishing things started is an important part of efficiency, so guide him to start only things simple enough to finish. Above all, if the parents co-operate and ''pull together,'' then wherever the only child may be living he has the greatest help of all—the unified, harmonious home.

Bring your toddlers as well as your babies to the Baby Clinics for advice and for periodic examination and weighing.

You may obtain information on all matters concerning child welfare by visiting the nearest Baby Clinic, or by writing to the Sister in Charge, or by communicating direct with the Baby Clinic Training Centre, Alfred street, Valley, N. 1, Brisbane.

HOME ECONOMICS.

FOLLOWING is an extract from an article—"Home Economics as an Education for Life"—by Miss G. M. Sedgwick in *Farming in South Africa* for February:—

We have made an auspicious beginning in South Africa. Some of our universities offer courses leading to the B.Sc. degree in home economics, but there is need for others to follow suit and to expand the field in more ways than are possible at present. Our technical colleges and other institutions offer courses in domestic science, but these emphasise mainly the development of skills and techniques in sewing, cooking, household management, &c.

It has long been felt, however, that this practical side of home-making, invaluable though it is, is not enough. Many of the time-honoured processes have disappeared from the home. What of spinning and weaving and the manufacture of clothes, breadmaking, dairying, the preservation of foods, to name only a few? The factory has assumed complete control of some of these processes, and is gradually taking over more and more. But this does not mean that we are free from all responsibility. On the contrary, it renders home-making more complicated, in that we now feel the need for a training in economics—home economics—which teaches us how to judge quality in food, clothing, textiles, and home equipment, so that we may buy wisely and obtain the maximum value for our money and the satisfaction which economical spending brings.

Health the Basis of Home Economics.

Basic to all home-economics teaching is health, and by health is meant mental as well as physical health. Maximum health for the family is sound economics, but to ensure this is no hit and miss affair. One of the most important aspects of home economics, therefore, is the study of foods in relation to health and growth. Healthy bodies are built up by nutritious and carefully-balanced meals; consequently a knowledge of food values and the principles of preparation and serving is essential. Hand in hand with nutrition goes the study of hygiene and sanitation, biology, chemistry and bio-chemistry, physiology, and physics, in order that the student may have an adequate appreciation of the many factors on which health is dependent.

Art in Home Economics.

Another phase of home economics is the question of beauty in the home. Beauty is no longer the exclusive possession of the rich; it is within the reach of all. Nevertheless, many who strive for beauty succeed in making for themselves only pretentious and unsuitable surroundings, because they do not know how to create the desired effect. Home economics teaches the basic principles of obtaining suitable, restful, artistic effects in our homes through knowledge of design, colour, and arrangement, rather than through the expenditure of large sums of money.

Home Economics as an Integrating Force.

Finally, home economics now embraces a still wider field, one which is intimately connected with every individual and which through the individual reaches out to the world at large, viz., the field of family relationships.

In order to gain insight into and to understand the many problems which beset the young wife and mother a thorough grounding in child guidance and in adolescent and adult psychology is given in order to stimulate interest in the solving of such problems as will arise during those first years when all too many promising marriages are wrecked and home life is spoiled. We can no longer trust to instinct. In the first place, we know very little about instinct, and we cannot be sure that instinct will help a girl to develop into a successful wife and mother any more than it will help a boy develop into a successful farmer or business man. Men have been studying their relationships to their employees for some time, but we are only beginning to see the importance of understanding the relationships with those persons with whom we are continually in contact in our home or social life and from whom we cannot be easily separated.

Home economics is trying to teach women that marriage is a life work worthy of their finest efforts, and not a welcome relief from some hated environment. The girl who takes this attitude stands far more chance of conserving and appreciating romance than does the one who marries for the sake of a home or social status, or the immature type who thinks that marriage should be merely a continuation of the courtship and who is poorly equipped to understand and to know how to cope with difficulties as they arise.

The problem of the care of children is now receiving wide recognition and attention. We find that children whose mothers have been trained to care for them are likely to be well-nourished and to have their mental and spiritual welfare cared for with intelligent effort and interest.

IN THE FARM KITCHEN.

COOKING WITHOUT WASTE.

It is amazing how much waste there can be in cooking if a careful watch is not kept on the little things. For instance, quite a lot can be wasted by ordering more food than is actually required, and by throwing away left-overs which, perhaps, could be used up for another meal.

Quite often, far too much fat is used when frying, and the same applies to eggs and crumbs when egging and crumbing. If any food is left over, use it up at the following meal or next day.

Following are some suggestions for variations of the dinner menu:—

MENU FOR OVEN DINNER.

Fillets of Fish with Cheese Sauce.

Take 6 fillets fish, 1½ cupfuls cooked spinach, kipper paste, 1½ tablespoonfuls grated cheese, 1½ cupfuls cheese sauce, nutmeg, pepper, salt, a little cayenne, juice ½ lemon.

Spread each fillet with kipper paste, using it very sparingly, then fold in two. Prepare spinach in the usual way. Season to taste with grated nutmeg, salt, pepper, and a little cayenne, and place in the bottom of a shallow, buttered, fireproof dish. Place fillets in another buttered fireproof dish. Add lemon juice. Cover with buttered paper and bake in a moderate oven for fifteen minutes, then place on top of the spinach. Sprinkle with the liquid from the fish dish. Cover with cheese sauce and sprinkle with grated cheese. Bake till golden brown.

Stuffed Roast Breast of Veal.

Take 4 lb. boned breast of veal, ¼ lb. breadcrumbs, 2 teaspoonfuls minced parsley, 1 beaten egg, ¼ teaspoonful grated lemon rind, 2 oz. suet, ½ teaspoonful dried herbs, salt, pepper, cayenne to taste.

Mix parsley, suet, crumbs, herbs, and lemon rind with enough egg to bind. Spread over veal. Add seasoning. Roll up and tie into a neat roll. Place in a baking tin. Cover with buttered paper. Cook in a very hot oven for ten minutes, then reduce heat and roast, allowing twenty minutes to the lb. and twenty minutes over. Baste frequently. One hour before it will be ready, add peeled potatoes brought to the boil, strained, and dipped in flour. Baste them with the hot fat in pan. Turn when brown below.

Apricot Cobbler.

Take 1 large tin apricots, ½ cupful milk, 2 cupfuls flour, 2 tablespoonfuls butter, ½ cupful cold water, 5 tablespoonfuls margarine, 1½ tablespoonfuls castor sugar, 1 tablespoonful lemon juice, 1 teaspoonful salt, 4 teaspoonfuls baking powder.

Pour apricots into a buttered pie-dish, keeping back ¾ cupful of the juice. Sprinkle with lemon juice. Dab with pieces of butter. Rub margarine lightly into the flour, sifted with the baking powder and salt. Stir in the sugar, then milk—and water if needed—to make a dough. Roll dough out, and place it on top of apricots. Do not bring it over the rim. Neaten round the edges. Prick with a fork. Brush with milk. Place in a hot oven. Bake for thirty minutes.

STEAMED DINNER MENU.

As the meat course is white, make tomato, split pea, or brown soup. Cook the chicken in the second tier of the steamer, above the water, the artichokes above that, and rhubarb on top. If using a waterless cooker instead of a tiered steamer, place the chicken in the bottom with the potatoes sliced round, but the bottom must be well greased. Dab the potatoes with butter or fat. Place the artichokes in one greased container, and put the rhubarb in the other.

Oatmeal Stuffing.

Take 1½ cupfuls oatmeal, 3 tablespoonfuls chopped suet, pepper, salt, 2 peeled onions, pinch dried herbs, beaten egg.

Mix all the ingredients together, chop the onions finely and add them. Bind all together with as much beaten egg as is necessary, and stuff the prepared fowl with it. Rub the bird with a cut lemon and place in steamer or cooker. Steam for two to three hours, depending on age of bird. Arrange potatoes round, if steamed in a cooker. Sprinkle with pepper and salt, and dab with butter.

Steamed Jerusalem Artichokes.

Take 1½ lb. artichokes, small piece butter, cold water, vinegar, pepper and salt.

First wash and scrape artichokes and drop at once into cold water, mixed with vinegar, to prevent discolouring (one tablespoonful to a quart of water). One hour before chicken is ready, place in a pan of the steamer or in container of cooker after buttering well. Sprinkle with pepper and salt and cook.

STEWED DINNER MENU.

Fillets of Fish.

Take 1 lb. fish fillets, 1 oz. butter, ½ pint milk and water mixed, 1 oz. flour, salt, and pepper.

Mix flour to a smooth paste with a little of the milk and water. Place the remaining milk and water in a saucepan and bring to boiling point. Add margarine, seasoning, and fish fillets. Keep under boiling point till the fish is cooked (in about fifteen to twenty minutes), then remove the fish and drain thoroughly. Add the blended flour to the liquid remaining in the saucepan and stir till boiling. Put the fish on a hot dish, pour sauce over, and garnish with lemon and parsley.

Stewed Scotch Rabbit.

Take 1 rabbit, 2 carrots, 1 sliced tomato, 2 tablespoonfuls bacon fat, 2 cloves, 8 small onions, 1 small turnip, 2 stalks celery, salt and pepper, flour.

First scald, dry, and joint rabbit. Dip in seasoned flour. Melt bacon fat in a saucepan. Add rabbit joints and fry until brown all over. Add peeled onions and brown a little, then stir in sliced tomato, carrots, turnip, celery, cloves, and pepper and salt to taste. Barely cover with boiling water. Cover with lid. Simmer gently from two to three hours or until meat is tender. Serve with steamed potatoes.

Stewed Prunes.

Take ½ lb. dried prunes, ¾ cupful sugar, ¼ teaspoonful ground cinnamon, 1 quart water.

Wash the prunes well, drain, and place in a basin. Cover with the quart of water and stand overnight. Next morning, turn prunes and water into a saucepan. Add sugar and cinnamon, and when sugar is dissolved, simmer until tender. Serve with whipped cream.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

Table showing the Average Rainfall for the Month of February in the Agricultural Districts, together with Total Rainfall during 1939 and 1938, for Comparison.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Feb.	No. of years' records.	Feb., 1939.	Feb., 1938.
North Coast.	In.		In.	In.
Atherton	10·84	38	29·56	16·68
Cairns	15·74	57	38·63	14·91
Cardwell	16·93	67	21·84	12·23
Cooktown	13·71	63	17·70	13·36
Herberton	8·12	53	18·01	15·28
Ingham	16·48	47	28·15	28·83
Innisfail	22·76	58	38·18	28·99
Mossman Mill	18·57	26	35·13	20·90
Townsville	11·22	68	9·47	15·35
Central Coast.				
Ayr	9·20	52	18·20	12·87
Bowen	8·75	68	10·01	9·94
Charters Towers	4·48	57	5·65	5·84
Mackay P.O.	11·80	68	11·76	12·86
Mackay Sugar Experiment Station	11·21	42	14·45	11·56
Proserpine	12·49	36	27·90	12·18
St. Lawrence	7·68	68	1·36	2·01
South Coast.				
Biggenden	4·28	40	2·29	0·54
Bundaberg	6·43	56	2·36	0·72
Brisbane	6·32	87	2·61	5·62
Caboolture	7·69	52	1·62	3·80
Childers	6·59	44	2·74	2·13
Crohamhurst	12·58	46	4·45	2·27
Esk	5·34	52	0·38	1·48
South Coast—contd.	In.		In.	In.
Gatton College	3·43	40	0·33	0·83
Gayndah	4·16	68	1·25	1·34
Gympie	6·72	69	1·79	1·76
Kilkivan	4·84	60	2·15	0·55
Maryborough	6·73	68	2·05	1·86
Nambour	9·57	43	3·23	4·22
Nanango	3·99	57	0·79	0·68
Rockhampton	7·64	68	3·37	0·46
Woodford	8·29	52	2·83	1·13
Central Highlands.				
Clermont	4·20	68	0·77	4·88
Gindie	2·68	40	..	0·10
Springsure	3·79	70	1·50	0·24
Darling Downs.				
Dalby	2·77	69	1·93	0·32
Emu Vale	2·51	43	..	1·69
Hermitage	2·31	33	..	0·40
Jimbour	2·55	51	1·18	..
Miles	2·64	54	0·50	0·01
Stanthorpe	3·13	66	0·28	1·86
Toowoomba	4·47	67	0·94	1·80
Warwick	3·01	74	1·05	2·12
Maranoa.				
Bungeworgorai	2·18	25	..	0·80
Roma	2·87	65	0·13	0·65

A. S. RICHARDS, Divisional Meteorologist.

CLIMATOLOGICAL TABLE—FEBRUARY, 1939.

Compiled from Telegraphic Reports.

Districts and Stations.	Mean Atmospheric Pressure, at 9 a.m.	Shade Temperature.						Rainfall.	
		Means.		Extremes.				Total.	Wet Days
		Max.	Min.	Max.	Date.	Min.	Date.		
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	29·78	85	75	89	3	72	12	1,770	18
Herberton	..	78	64	85	19	58	20	1,801	18
Rockhampton	29·91	87	71	95	3	69	6, 11, 15 to 18	337	13
Brisbane	30·01	84	69	103	3	65	9	261	9
Darling Downs.									
Dalby	29·99	87	64	98	3	59	5, 11, 9	193	4
Stanthorpe	..	82	58	92	3	48	8, 14	28	2
Toowoomba	..	82	62	96	3	57	5	94	4
Mid-Interior.									
Georgetown	29·80	90	73	104	1	67	13	1,107	17
Longreach	29·84	96	74	107	3	66	28	113	8
Mitchell	29·92	89	69	98	3	63	11	31	2
Western.									
Burketown	29·77	89	76	99	1	69	13	1,399	16
Boulia	29·78	94	72	109	3	57	28	294	6
Thargomindah	29·86	94	74	104	2	58	28	299	4

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	April. 1939.		May, 1939.		MOONRISE.	
					April. 1939.	May., 1939.
	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					p.m.	p.m.
1	6·1	5·50	6·18	5·20	3·35	3·36
2	6·1	5·49	6·18	5·19	4·18	4·17
3	6·2	5·48	6·19	5·19	5·1	5·1
4	6·2	5·47	6·19	5·18	5·43	5·47
5	6·3	5·46	6·20	5·17	6·26	6·35
6	6·3	5·45	6·21	5·17	7·11	7·26
7	6·4	5·44	6·21	5·16	7·58	8·18
8	6·4	5·43	6·22	5·15	8·47	9·10
9	6·5	5·42	6·22	5·14	9·37	10·2
10	6·5	5·41	6·23	5·14	10·37	10·55
11	6·6	5·40	6·23	5·13	11·21	11·44
12	6 6	5·39	6·24	5·12	..	..
					a.m.	a.m.
13	6·7	5·38	6·25	5·12	12·11	12·38
14	6·7	5·37	6·25	5·11	1·3	1·29
15	6·8	5·36	6·26	5·10	1·55	2·20
16	6·8	5·35	6·26	5·10	2·46	3·15
17	6·9	5·34	6·27	5·9	3·40	4·12
18	6·10	5·33	6·28	5·9	4·32	5·8
19	6·10	5·32	6·28	5·8	5·28	6·8
20	6·11	5·31	6·29	5·8	6·23	7·8
21	6·11	5 30	6·30	5·7	7·22	8·9
22	6·12	5·28	6·30	5·7	8·22	9·7
23	6·12	5·27	6·31	5·6	9·17	9·58
24	6·13	5·27	6·32	5·6	10·17	10·48
25	6·13	5·26	6·32	5·6	11·11	11·32
					p.m.	p.m.
26	6·14	5·25	6·33	5·5	12·1	12·15
27	6 14	5·24	6·33	5·5	12·49	12·57
28	6·15	5·24	6·34	5·5	1·31	1·35
29	6·15	5·23	6·35	5·4	2·15	2·16
30	6·16	5·22	6·35	5·4	2·55	2·57
31			6·36	5.3		3·42

Phases of the Moon, Occultations, &c.

4th	Apr.	○	Full Moon	2 18 p.m.
12th	„	☾	Last Quarter	2 11 a.m.
20th	„	●	New Moon	2 35 a.m.
27th	„	☽	First Quarter	4 25 a.m.

Perigee, 1st April, at 9.0 p.m.
Apogee, 13th April, at 7.0 p.m.
Perigee, 28th April, at 8.0 p.m.

The most interesting conjunction will occur at noon on the 22nd, when Venus and Jupiter will be separated by less than half a degree. With some magnification they may be found, at their nearest approach, about half-way from the zenith to the point where the Sun sets. Both planets will set at nearly the same time, 3.50 p.m. Very interested observers will see them above the eastern horizon in the early morning, as they will rise within a few minutes of one another, about 3.30 a.m.

Mercury rises at 6.16 a.m., 15 minutes after the Sun, and sets at 5.55 p.m., 5 minutes after it on the 1st; on the 15th it rises at 4.46 a.m, 1 hour 22 minutes before the Sun, and sets at 4.44 p.m., 52 minutes before it.

Venus rises at 3.1 a.m., 3 hours before the Sun, and sets at 3.58 p.m., 1 hour 52 minutes before it; on the 15th it rises at 3.20 a.m., 2 hours 48 minutes before the Sun, and sets at 3.56 p.m., 1 hour 40 minutes before it.

Mars rises at 10.48 p.m. on the 1st, and sets at 12.39 p.m. on the 2nd; on the 15th it rises at 10.30 p.m., and sets at 12.12 p.m. on the 16th.

Jupiter rises at 4.34 a.m., and sets at 4.59 p.m. on the 1st; on the 15th it rises at 3.53 a.m., and sets at 4.15 p.m.

Saturn rises at 6.42 a.m., and sets at 6.25 p.m. on the 1st; on the 15th it rises at 5.56 a.m., and sets at 5.36 p.m.

Barring a total solar eclipse with its marvellous phenomena, an annular eclipse would be a most fascinating sight. On the 19th the Moon, one day before New, will arrive at one of its nodes; the point in its orbit where it crosses the path of the Earth and is directly between us and the Sun, and its solid body cuts off the light from our globe—but not entirely. Being near Apogee, its furthest distance from us, its shadow does not quite reach the Earth, and it looks smaller than it does at Perigee, its nearest approach. It, therefore, does not quite cover the Sun's bright face, and a narrow luminous ring is left in the darkened sky. In this instance it will only be seen in Alaska and the Arctic Regions, and at its most favourable position will last but one and a-half minute. A partial eclipse will be seen in the British Isles and throughout North America.

4th	May	○	Full Moon	1 15 a.m.
11th	„	☾	Last Quarter	8 40 p.m.
19th	„	●	New Moon	2 25 p.m.
26th	„	☽	First Quarter	9 20 a.m.

Perigee, 23rd May, at 10.0 p.m.
Apogee, 11th May, at 3.0 p.m.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S. add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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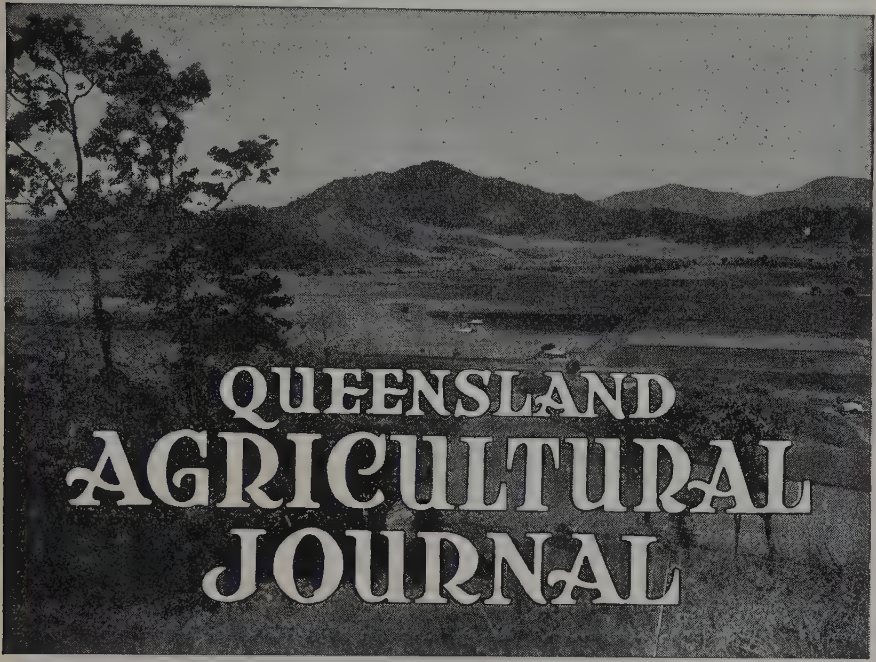
ANNUAL RATES OF SUBSCRIPTION.—Farmers, Graziers, Horticulturists, and Schools of Arts, **One Shilling,** members of Agricultural Societies, **Five Shillings,** including postage. General Public, **Ten Shillings,** including postage.



QUEENSLAND AGRICULTURAL JOURNAL

Vol. LI. 1 MAY, 1939 Part 5

Event and Comment

Anzac.

WITHOUT national sentiment there can be no true national life. Proper sentiment and tradition are an expression of the soul of a people—that was the keynote of the commemoration of the Gallipoli landing on 25th April, the twenty-fourth anniversary of the great event. The hitherto untried troops of Australia and New Zealand received their baptism of fire on the beach at Anzac Cove on the first Anzac morning under conditions which would have tested the stoutest hearted veterans—such as they afterwards became on other battlefields of the World War of 1914-1918. The men of the 1st and 2nd Divisions of the Australian Imperial Force and of the New Zealand Expeditionary Force, together with their comrades of the Royal Navy and British Expeditionary Force, set standards and established traditions which inspired their fellows in the later campaigns. In a moment those men of our race became "the living theme of boys unborn for countless centuries; peers of the noblest souls that God has fired—part of the amplest feat of history."

In their observation of Anzac Day year after year, the people of Australia not only pay a tribute to the men who went West, and to the women who suffered so much, but keep alive memories of their achievements and ideals—and of their sacrifice—and so assist in the creation of a powerful inspirational force in the life of their own homeland. Anzac Day is to us an appeal—and to those who come after us, a perpetual appeal—not to glorify war, but to seek to achieve the highest ideals of citizenship as exemplified by the makers of the Anzac Tradition which will endure while the nation lasts.

Grow More Cotton!

IN the course of a recent broadcast address to farmers, the Acting Minister for Agriculture and Stock, Hon. David A. Gledson, advocated an extension of the cotton acreage in districts adapted to the cultivation of the fibre. "I do so," he said, "with the fullest confidence that an increased production of cotton in Queensland is in the best interests of the farmers of this State and of the people of Australia as a whole."

Continuing, Mr. Gledson said that the establishment of the cotton spinning and weaving industries in Australia twelve years ago, and their rapid expansion during the past five years, had created a big market for cotton. For 1939, consumption of raw cotton lint in Australia would be 35,000 bales, while in Queensland we were only producing 13,000 bales. There was, then, a big leeway to make up before we could supply Australian requirements, which were increasing every year.

Primary producers and farmers generally in Queensland were faced with many serious problems, Mr. Gledson added. These included the obtaining of a profitable market for the commodities which they produced, and the establishment of a balanced system of farming in this State. The old adage of the danger of putting all one's eggs in the one basket still remained true, and it was the policy of his Department to build up as far as it was possible an economical and balanced system of farming, and of primary production generally in Queensland.

In this respect, the cotton industry offered great possibilities. The growing of cotton in combination with dairying and other rural pursuits offered an opportunity of establishing a balance in primary production, which was so much desired.

Research officers of his Department had demonstrated that cotton grown in rotation with Rhodes grass and other fodder crops was an efficient method of production, and helped to give that balance in Queensland agriculture which they were striving to achieve.

This method of crop rotation would particularly apply to a cotton-dairying combination. Increased cotton production would also benefit our great dairying industry in a way not generally realised, by making available a cheap dairy stock food of high protein content—cotton-seed meal—which, fed to dairy herds during the winter months, would assist in maintaining continuity in butter production at a high level throughout the year.

The extremely low prices for wheat ruling at present, with the disturbed international situation and the uncertain oversea markets for this product, was a matter of deep concern to wheat farmers, who were now making plans and preparing land for next season's sowing of wheat. He would suggest that where the land and conditions were suitable, wheat farmers might consider setting aside 20 to 50 acres of land for planting cotton.

As for a profitable market for cotton, they had in Australia a market for all the cotton we can grow, and he knew that farmers would agree with him that the Australian home market was their best market. Since 1935 the average net return to cotton-growers by the Cotton Board had been 4d. per pound of seed cotton delivered on rails.

To depend mainly upon overseas markets for the commodities which we produce was in the present state of international affairs to risk seriously our future prosperity.

Another point on which he felt safe in advocating increased cotton production was from an Australian national point of view. Cotton was of vital importance in any defence scheme which Australia must devise. Cotton in some form or other entered into the life of every individual Australian, and it was used extensively in key industries which were vital to the economic life of this country. Increased production of cotton would not have to compete on glutted overseas markets and at the varying price levels on those markets. It could be absorbed by Australian secondary industries to meet the requirements of the Australian people for manufactured cotton goods. He thought that this was the strongest argument behind the Queensland Cotton Board's advocacy of increased production of raw cotton—that it would build up our secondary industries, supply our own people with the manufactured goods which are at present imported, and be the means of stimulating the industrial and economic life of the whole of the Commonwealth.

The Minister asked farmers and other primary producers who were in a position to grow cotton to consider very carefully the appeal of the Cotton Board, both in respect of their own interest in the stabilisation of primary industries, and their interest in national security.

Australia must be in the position to rely on herself, and it was in this regard that he asked that farmers grow cotton, or increase their present acreage wherever possible. The officers of his Department would supply the fullest information and guidance on all matters relating to the cotton industry.

Cotton Culture.

THE Queensland cotton industry is established on a co-operative basis and is one of the few industries in which the product grown is handled by the growers' organisation from the field to the manufacturer. This organisation, the Queensland Cotton Board, takes control of the seed cotton when it leaves the farm, transports it to the nearest ginnery, gins the cotton, markets the lint, and manufactures by-products, all the resultant profits being returned to the grower.

Over a number of years, cotton has proved its adaptability to the conditions within the recognised cotton-growing regions, and can be successfully grown on most of the main soil types within these areas. It offers distinct advantages over many other crops because of its drought-resistant qualities.

The stability of cultivations newly broken up out of the original grasslands has been studied carefully for several years, and it is obvious that substantial benefits are obtained on most soils when cotton is grown in rotation with pastures of a sufficient stage of establishment. The benefits which may be expected are increased yield per acre; improvement in lint quality; and reduced costs of production.

To maintain the Queensland cotton-growing industry on a firm basis, it is incumbent on the growers to supply fully the requirements of the spinners. To accomplish this, increased areas are necessary. When the general suitability of cotton for most of the soil types of the south-eastern portion of this State is considered, it becomes all the more apparent that growers cannot afford to exclude cotton from their system of farm cropping.

Little-leaf—A Functional Disorder of Apple Trees at Stanthorpe.

KEIGHLEY M. WARD, M.Agr.Sc., Research Officer.

THE term "little-leaf" as applied to deciduous fruit trees refers to a physiological disorder of which the major effects are the suppression of shoot growth, the production of subnormal leaves and fruit, the dying back of branches, and the reduction of cropping. The name has arisen because the most conspicuous symptom of the trouble, and the first to become evident, is the growth in spring of small, even tiny leaves instead of normal ones. Such leaves are found mainly at the terminal parts of the branches, and especially on wood produced in recent seasons. The fact that these leaves are usually arranged in small rosettes has led to the term "rosette" also being used to describe the disorder. This condition has existed on apple trees in the Stanthorpe district for some ten or twelve years.

For the most part, the fruit-producing soils of the district are of a coarse sandy nature with a tendency to dry out quickly. This is a common feature also of overseas areas where little-leaf has become a serious trouble in deciduous fruit orchards. The disorder has assumed considerable importance in Stanthorpe orchards on account of the rapidity with which the number of affected trees has increased, and of the fact that it is fairly widespread among the more important varieties of apples grown. There is evidence which suggests that the better, vigorous type of tree is somewhat more susceptible to the trouble than others. Fortunately, in this district, though it has been noted on pear and plum trees in several instances, it has not appeared extensively in fruit trees other than the apple.

In view of the extent of the disorder, the serious effect it has on apple trees, and the absence of suitable control measures, some concern was felt among apple growers, and for these reasons investigations were undertaken with the object of finding the most effective means of restoring affected trees to a normal condition and of preventing the further increase of the trouble. The earlier work on the problem was conducted by other departmental officers—namely, Messrs. R. B. Morwood and H. St. J. Pratt. The work now being carried out is based primarily on the results of overseas investigations which have shown that the occurrence of little-leaf is associated with the supply of zinc to affected trees.

This article is a progress report on the writer's experimental work which was begun on apple trees late in 1936, and the results reported are based on the response given by various treatments during the 1937-38 growing season.

DESCRIPTION OF LITTLE-LEAF.

Incipient Stage.

Prior to the appearance of the most characteristic symptoms there is often a tendency towards shortening of internodes on the shoots produced at the terminal portion of the branch in spring and summer. This shortening may not be very marked, and may occur irregularly along the length of the shoot. Another symptom of the onset of the disorder is the appearance, usually in summer and autumn, of mottled leaves. Mottling may, however, become evident in spring. A typically

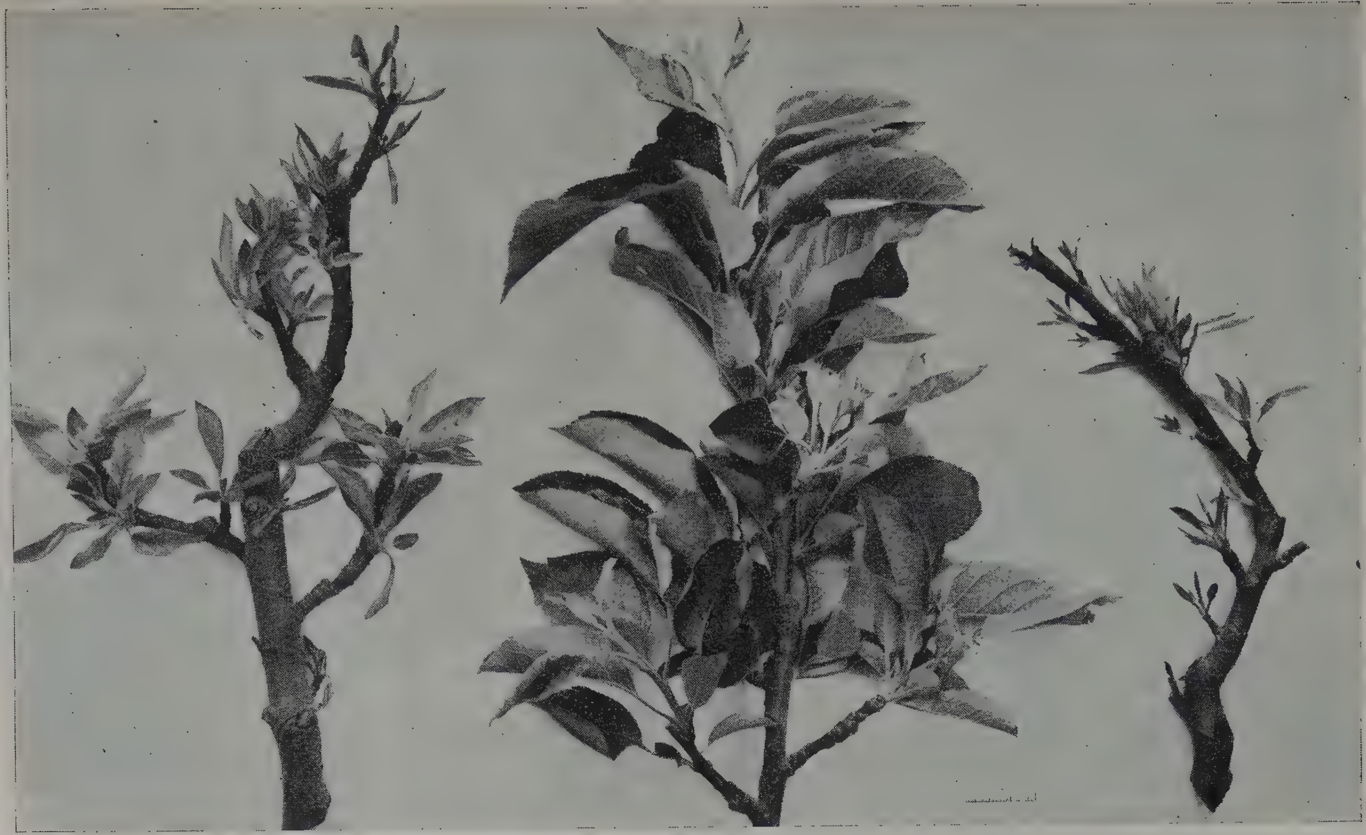


Plate 173.

Typical little-leaf growth showing spring symptoms, as compared with normal growth.

mottled leaf is chlorotic or yellowish in the interveinal areas, but the normal green colour remains in the region of the main veins. This mottling is also associated with the more advanced stages.

Later Stages.

Almost invariably the presence of the disorder is first observed in spring when there is a delay, perhaps for as long as two weeks, in the leafing-out of the terminal growth on one or more branches of the tree. When the leaves appear they are greatly reduced in size, are rigid and narrow, and arise from the parent twig at an acute angle. They develop slowly and usually remain only a fraction of the normal size throughout the season, forming small rosettes at each bud on the parent wood (Plates 173 and 174.) Mottling of the small leaves and often also of other foliage near affected shoots is a characteristic symptom during the summer. Terminal shoot growth is either completely lacking or is greatly suppressed and in marked contrast to that of the previous season (Plate 178; shoots 1 and 2).

In the season following the appearance of growth such as this, the buds on little-leaf shoots may fail to break altogether, and thus neither foliation nor shoot elongation takes place (Plate 175). Later, the shoot commences to die from the tip, and this dieback proceeds downwards into the older wood, resulting in the death of a considerable portion of the branch. A characteristic feature of this dying back is the very clearly defined line of demarcation between the dead and living tissue. In the early stages only a few branches on the tree may show signs of the disorder, but the whole tree is liable to become affected within a few seasons.

Although the terminal part of a little-leaf branch may not grow, it appears to be characteristic of the disorder that vigorous growth arises from several points immediately below the terminal, and subsequently if the branch be pruned back to a strong shoot, which thus becomes the terminal, that shoot invariably develops little-leaf within the next season or two. If this pruning treatment of the trouble be practised for a few seasons, the tree becomes seriously unbalanced (Plate 176) or if applied to the whole tree there is a rapid decrease in its stature.

The fruit produced on little-leaf trees, particularly on affected branches, is usually much reduced in size (Plate 177) and there is a deterioration in flavour, although the keeping quality does not appear to be destroyed. The cropping capacity of affected trees is, however, seriously reduced, and it is evident that such trees could reach an unprofitable condition within a few seasons.

The disorder is most readily observed in young vigorous trees growing on either seedling or Northern Spy rootstocks, or in trees that have been top-worked to another variety. Nevertheless, older and less vigorous trees are equally subject to attack, and though they may show clear symptoms of the disorder, under some circumstances it may be difficult to distinguish between true little-leaf and unthriftiness.

STANTHORPE EXPERIMENTS.

The measures being investigated at Stanthorpe in order to find effective means of supplying zinc to apple trees include foliage and dormant-period sprays applied at various strengths, soil dressings at

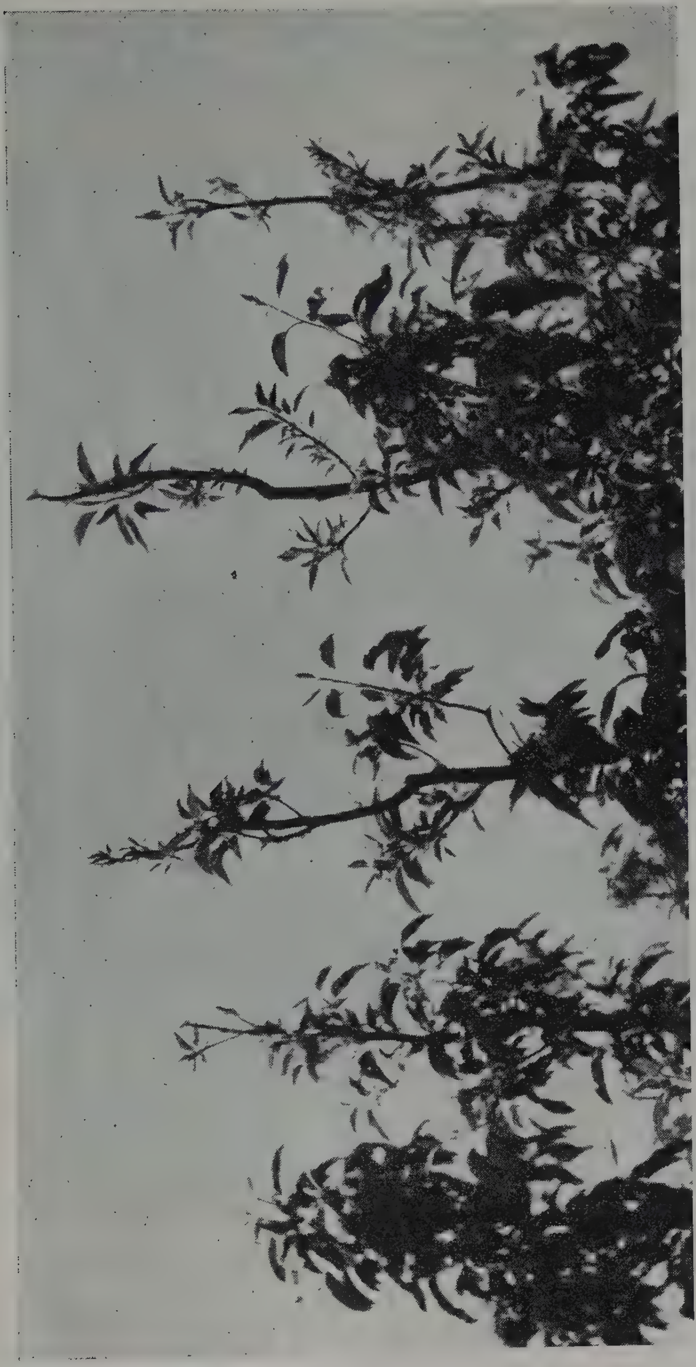


Plate 174.

Characteristic appearance of growth at the extremities of branches affected with little-leaf. Photograph loaned by Mr. H. St. J. Pratt.

different rates, and tree injections. The treatments are being applied to apple trees which vary in their age, severity and period of attack by the disorder, rootstock and general condition of health. The work has involved the initiation of five experiments on a total of 264 trees. In each experiment the treatments are applied according to a replicated and randomised system of plots, the unit of treatment being a single tree showing definite symptoms of the disorder.

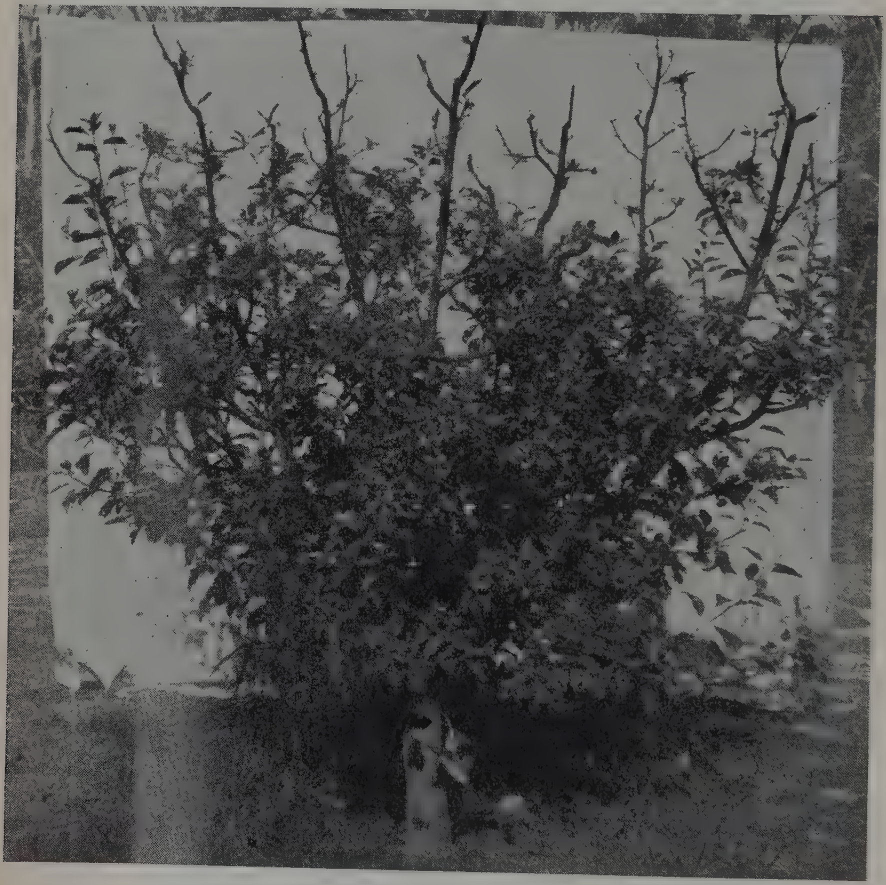


Plate 175.

Jonathan apple tree severely affected with little-leaf and showing the suppression of shoot growth on a previously vigorous tree.

The effects of the various measures are determined from two aspects—firstly, nature and amount of the immediate response, and secondly, duration of response.

A satisfactory quantitative method of expressing the amount of response is being sought by measuring—(i.) the total terminal shoot growth on each tree; (ii.) the increase in length of terminal shoots on little-leaf branches only—measurements are made during the season preceding treatment and the following season; (iii.) the number of little-leaf branches per tree; (iv.) yield in weight of fruit per tree. In order to increase the accuracy of the work a system has been introduced of recording the history of each branch on all experimental trees.

In some experiments, trees are to receive the same treatment annually until it is established whether or no they will respond to that treatment, and in others—*e.g.*, experiments on strengths of foliage and dormant sprays—the duration of response following a single application of the treatments is to be observed.

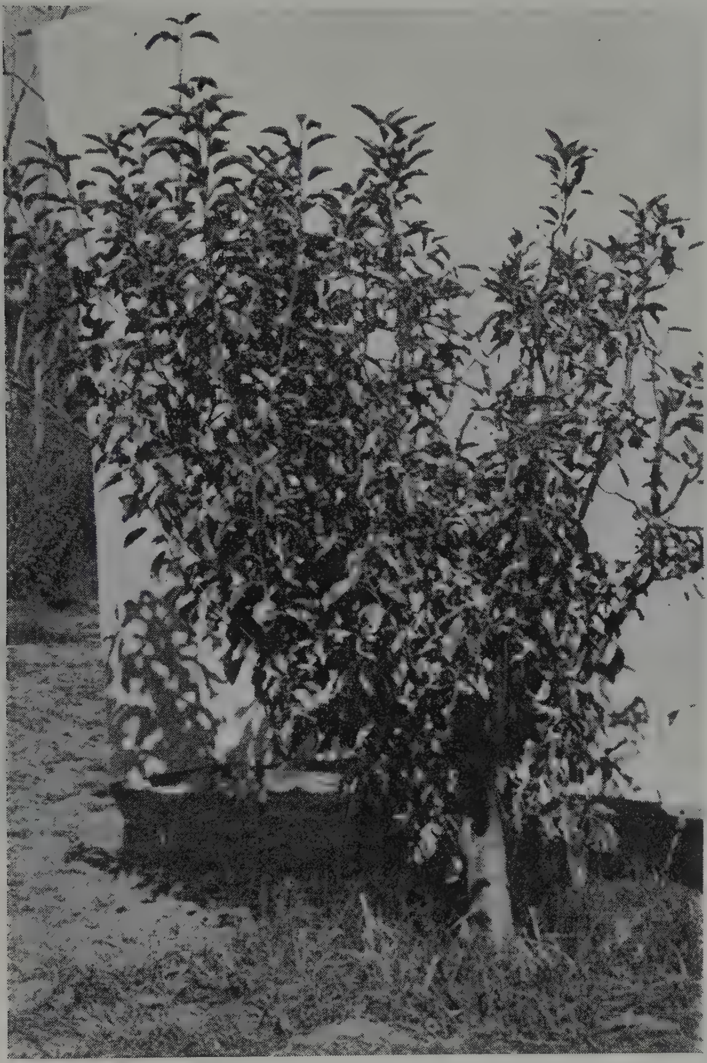


Plate 176.

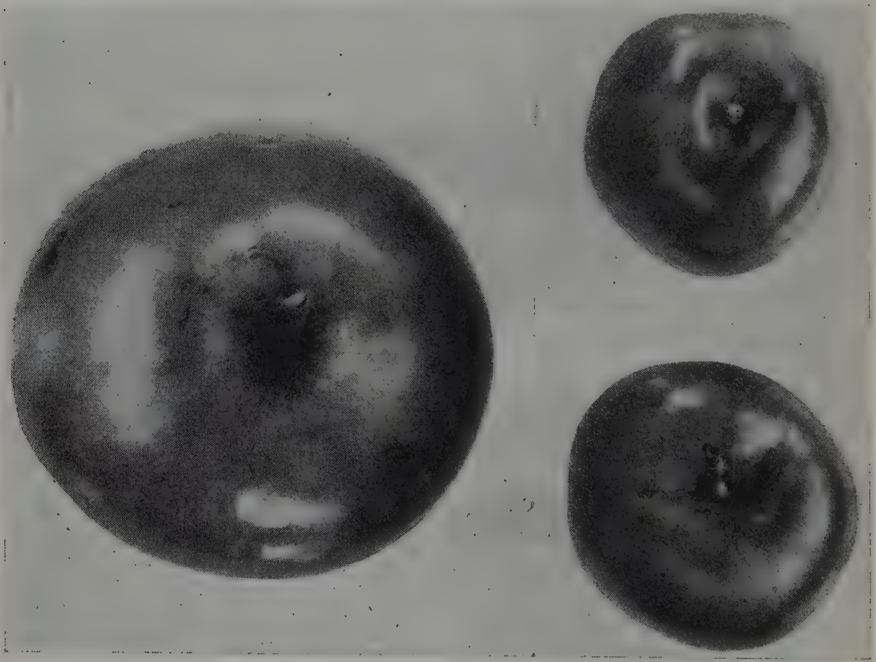
Apple tree showing the unbalancing effect produced by little-leaf.

Fundamental work relating to the cause of little-leaf has not been undertaken at Stanthorpe up to the present time in view of the relatively advanced stage of such work overseas. Potential causes of the disorder are discussed in the latter part of this article.

Description of the Experiments.

In 1937 four groups of experiments were initiated on apple trees growing under a variety of conditions. The experiments are described below.

A. The first experimental block consists of eighty nine-year-old trees which comprise Jonathan, Delicious, and Granny Smith varieties, growing on seedling rootstocks. Apart from being retarded by little-leaf, they generally tend to be unthrifty as do other trees in this orchard; that is to say, little-leaf is not the only factor which limits their growth. In addition to zinc treatments therefore, they are receiving dressings of complete fertilizer. They have exhibited the disorder in a severe form for about six years.



A B

Plate 177.

A. Fruit from normal tree. B. Fruit from little-leaf tree.

B. The second group consists of forty-eight full-bearing Granny Smith trees, twenty-one years old, growing on Northern Spy roots. These trees were vigorous until four or five years ago but then became affected with little-leaf in varying degrees of severity. They now exhibit signs of unthriftiness, and sometimes only careful observation will show the distinction between this condition and true little-leaf.

C. The third group is made up of sixty-four six-year-old trees consisting of Jonathans, Delicious, and top-worked Gravensteins, all of which are on French seedling rootstocks. The general health of the trees is from fair to good. Little-leaf has developed on these during the past two or three years only.

D. The fourth experiment is being conducted on fifty-six eight-year-old Jonathan and Granny Smith trees growing on seedling roots. These belong to a vigorous type of tree whose growth has not apparently been limited by any major factor other than little-leaf. They are the only trees which have responded to any of the zinc treatments in such a way that the response could be expressed in terms of growth increase. They have become affected with the disorder within the past four years.

E. A fifth experiment was begun in the winter of 1938 on Delicious and Jonathan trees growing on seedling and Northern Spy roots. Those on the former stock have grown into the larger trees, and in general, the Delicious are more vigorous than the Jonathans. The trees on Northern Spy roots have been affected with little-leaf for about three years, and those on the seedling stocks have developed the trouble during the past two years only.

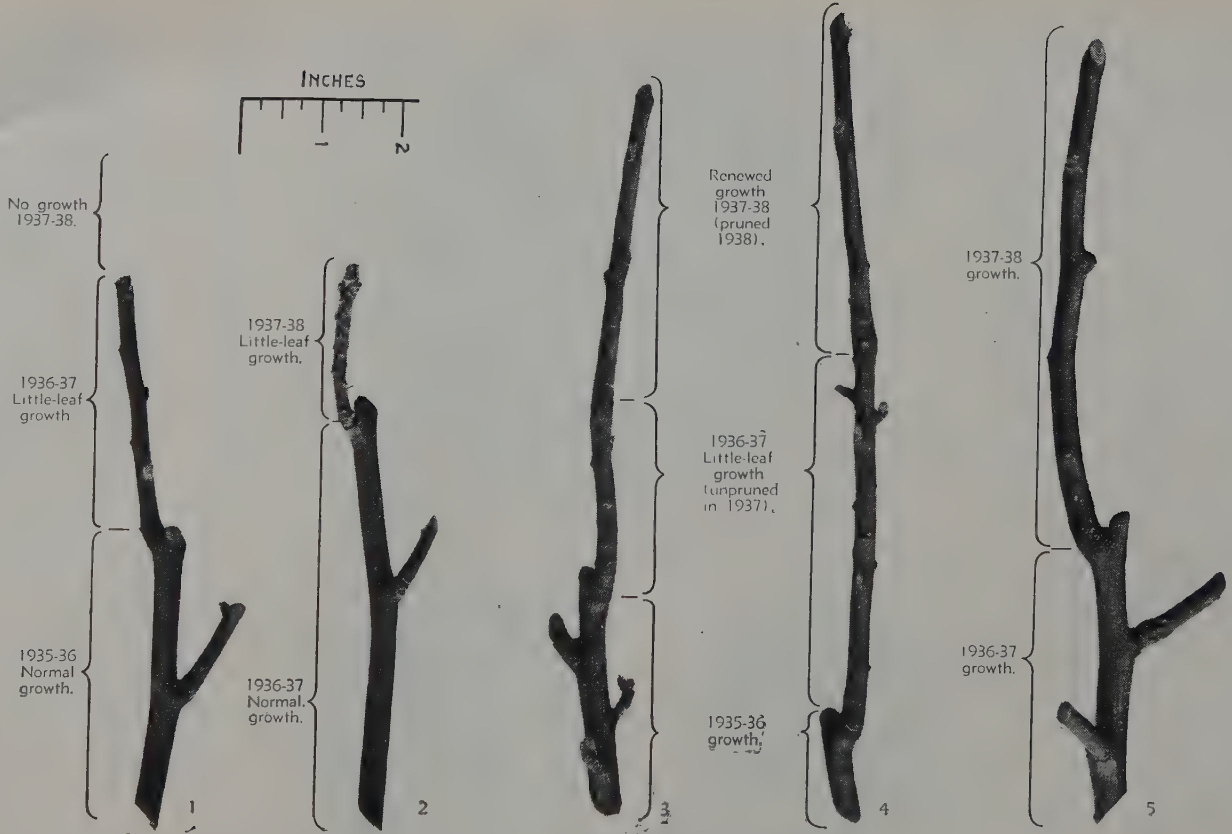
In experiments A, B, and D, the treatments being applied are dormant-period and foliage sprays, soil dressings at different rates, and tree injections. Zinc sulphate is the principal form in which zinc is being supplied, but some of the treatments involve the use of zinc oxide. Treatments in experiment C consist of foliage sprays only, the materials used being zinc sulphate and zinc oxide applied in November at various strengths. For purposes of comparison, a dormant spray has been included in the experiment, and this was applied in July, 1938. In experiment E various strengths of dormant-period zinc sulphate sprays are being tried; they were applied early in August, 1938.

Results in the 1937-38 Season.

In the first three experiments (A, B, and C) no treatment has yet shown response which can be expressed quantitatively. In the A and B experiments, however, there appeared to be a consistent response to dormant-period sprays—a response which has been reflected in the production of normal sized and unmottled foliage on previously affected parts of the trees. It is doubtful whether any other treatment in these two experiments has given any consistent results. No response occurred on the trees in experiment C during the 1937-38 growing season. Possibly there will be an improvement in the 1938-39 growing period as the result of some, at least, of the treatments. The results of experiment E will not begin to be shown until the 1938-39 season.

The fourth experiment D has resulted in more definite and quantitative responses. This is a randomised block trial in which seven different treatments, including untreated controls, are replicated eight times on single trees.

The various treatments employed are shown in Table I., and for each treatment the figures show the average increase in shoot growth on little-leaf branches, the total number of branches showing little-leaf before treatment (1937) and after (1938), and also the average total terminal shoot growth on each group of eight trees receiving any one particular treatment. Last season's measurements showed a high degree of variability between and within treatments, and so the differences between treatments must be large before they become significant. In the case of growth increase on little-leaf branches (column 1), one treatment cannot be said to have given better results than another unless there is a difference of 19·5 centimetres.


INCHES
1
2
No growth 1937-38.
1936-37 Little-leaf growth
1935-36 Normal growth.
1
1937-38 Little-leaf growth.
1936-37 Normal. growth.
2
Renewed growth 1937-38 (pruned 1938).
1936-37 Little-leaf growth (unpruned in 1937).
1935-36 growth.
3
4
1937-38 growth.
1936-37 growth.
5

Typical little shoots at terminal of main branches.

Showing Little-leaf growth 1936-37 and recovery in 1937-38 following dormant period spray.

Normal terminal shoot.

Plate 178.

A perusal of the table will show that terminal growth on little-leaf branches (column 1) increased significantly only on trees which received dormant-period sprays (treatments I. and II.). The response to treatment on these sixteen trees was consistent and was outstanding when compared with any other treatment. The most satisfactory feature of this response was that it occurred on wood which was definitely affected with little-leaf in the previous season (Plate 178). Furthermore, the dormant sprays were followed by renewed growth within about three months of their application; the sprays were applied late in July, and from the early part of the ensuing growing season there was an improvement in shoot growth.

Injections probably gave the most inconsistent results, as in some cases all little-leaf branches on an injected tree apparently recovered and added a considerable amount of growth during the season, while other trees, usually ones more severely affected, failed to show any response at all. It would appear either that the injected solution had not reached all parts of the tree in some cases, or that insufficient time had elapsed to allow recovery to take place.

TABLE I.

RESULTS OF LITTLE-LEAF EXPERIMENT D, 1937-38.

Treatments.	Column 1. Average Terminal Growth Increase on Little-leaf Branches.	Column 2. Total No. Little-leaf Branches. 1937.	1938.	Column 3. Average Total Terminal Shoot Growth per Tree.
	cms.			cms.
I. Dormant spray, 50 lb. $ZnSO_4$/100 gal. before pruning (July)	35·5	12	0	775
II. Dormant spray 50/100, immediately after pruning	39·4	18	3	785
III. Injection 0·125% solution in October	data incomplete	26	42	441
IV. Foliage spray 10–5–100 in November	11·3	24	25	665
V. Soil application 5lb. $ZnSO_4$ per tree	19·6	21	20	556
VI. Soil application 2½lb. ZnO per tree	11·5	21	25	590
VII. Control—untreated ..	8·1	22	29	481
S.E. for growth increase on little-leaf branches = 6·9. Significant difference = 19·5. ($P < 0{\cdot}01$)				Differences not significant.

Although the trees in this experiment have not yet responded to any of the other treatments, it is possible that some of them will show results in the 1938-39 season.

From column 2 in this table it is obvious that on trees which received treatments I. and II. there was a well-marked improvement in the number of little-leaf branches in 1938, as compared with the number in the previous season, or with trees receiving other treatments. In column 3 is shown the total terminal shoot growth per tree, and although

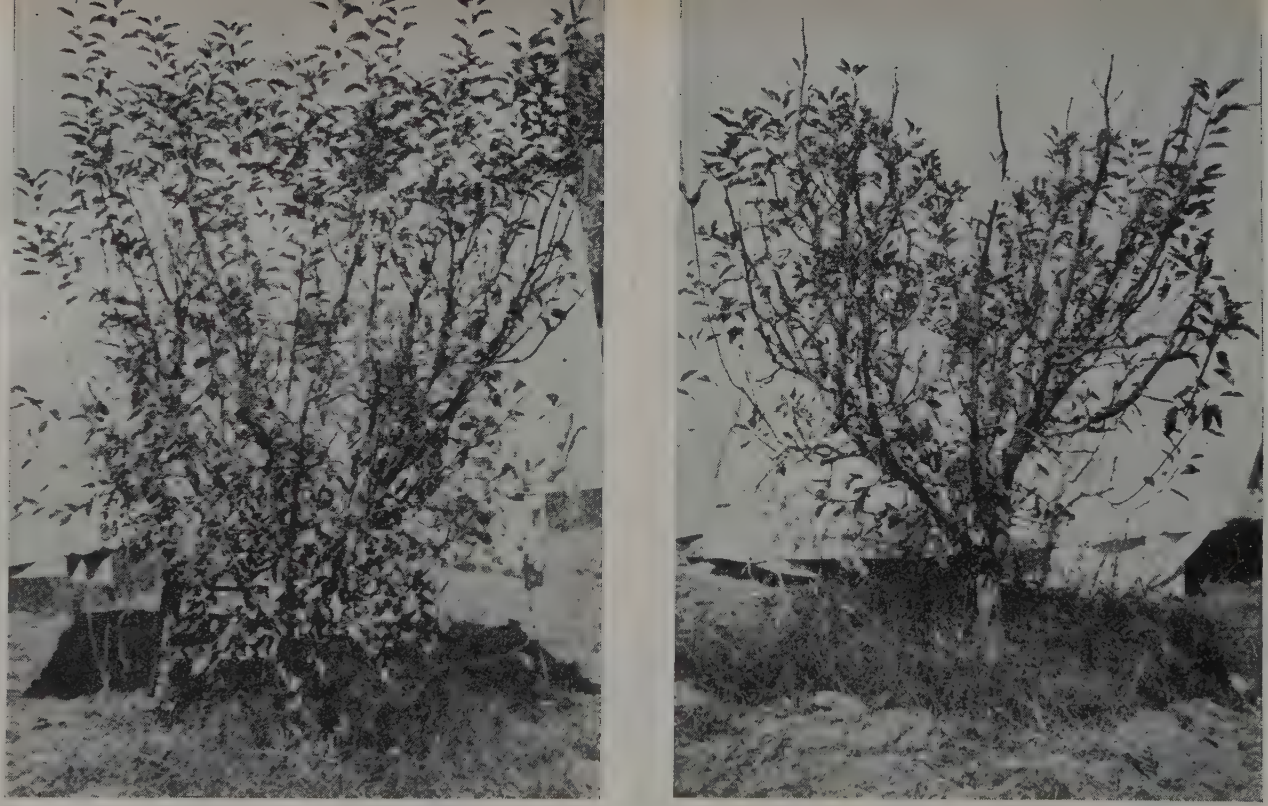


Plate 179.

Two adjoining Jonathan trees in Experiment D. In 1936-37 tree A added 239 cms. of terminal growth, and B 79 cms., as compared with 800 cms. on a normal tree. In the winter of 1937 A received a zinc sulphate spray, and B was left unsprayed. In 1937-38 A produced 525 cms. of terminal growth, and B 42 cms.

differences between these figures are not statistically significant, they indicate the general tendency of the little-leaf disorder to suppress terminal shoot growth. This tendency is perhaps more convincingly illustrated by Plate 179.

With reference to treatment II., in which a strong zinc sulphate spray was applied within five hours of the pruning of the trees, a certain amount of injury was caused. The spray solution apparently penetrated the twigs through the cut surface and passed down the length of the twig. This resulted in a strip of dead tissue appearing in the wood of the shoot and extending back 3 to 15 inches from the pruning cut. The injury was not severe, and, as the bark was not affected, it could not be observed until the shoot had been pruned. However, in orchard practice it is advisable to prevent such injury by applying the zinc spray either before the trees are pruned or not less than two weeks after pruning.

ZINC SULPHATE IN RELATION TO OTHER SPRAYS.

As yet much remains to be learned in connection with the interaction of zinc sulphate and other spray materials, but during the past two seasons a certain amount of information has been gathered on this subject.

The question often arises of combining zinc sulphate with lime sulphur or red oil in winter sprays, and with lead arsenate or white oil in summer sprays, since by such combinations growers seek to reduce to a minimum the number of occasions on which they need to spray. With respect to winter spraying, occasions arise when it is desired to treat apple trees with zinc sulphate to control little-leaf, and with lime sulphur or red oil to control diseases or pests. Under such circumstances the most satisfactory procedure would probably be to apply the zinc sulphate during the latter half of July and the other sprays towards the end of August. With respect to red oil, it is sound practice to avoid spraying the trees with this material just prior to the application of zinc sulphate, as the presence of the oil on the trees would tend to prevent the zinc spray from sticking to the bark and would probably hinder its penetration into the plant tissues.

A number of growers in the Stanthorpe district have adopted zinc sulphate foliage sprays in treating little-leaf, and consequently the question has been raised as to whether the combining of zinc sulphate with lime sulphur, white oil, or with lead arsenate in various summer sprays is advisable. Zinc sulphate can safely be combined with lime sulphur at the concentrations used in foliage sprays—*i.e.*, 10 lb. zinc sulphate, 5 lb. hydrated lime in 100 gallons of water, together with the appropriate strength of lime sulphur. No definite evidence has yet been secured to show whether zinc sulphate is effective against little-leaf when applied in combination with white oil, but, in general, the combination would seem to be an undesirable one.

The combination of zinc sulphate and lime with lead arsenate in foliage sprays is not always a safe one, as has been shown by overseas investigations (9). Although the presence of hydrated lime with the zinc sulphate in combination with lead arsenate tends to reduce arsenical injury by decreasing the amount of soluble arsenic, the zinc sulphate in the mixture has caused severe russetting of Ben Davis apples. In the Stanthorpe district last season, however, the application of a mixture of zinc sulphate and lime either alone or in combination with lead arsenate did not cause fruit russetting nor foliage injury on apple trees.

NOTES ON GENERAL RESEARCH ON LITTLE-LEAF.

Little-leaf has for years been a serious trouble on deciduous fruit trees in parts of the United States of America and in South Africa. In the former country all the main varieties of deciduous fruits, including grapes and walnuts, are affected by this disorder to a serious extent. A similar condition, known as "mottle-leaf," which occurs on *Citrus*, presumably arises from the same cause as little-leaf of deciduous fruits.

Much research has been directed towards finding the cause of the trouble and the part that zinc plays in plant growth. No parasitic organism, such as a fungus or a bacterium, has been found to be directly associated with affected trees; and grafting and transplanting experiments have indicated that the condition is not cause by a virus (8). Of a large number of chemical elements tried on fruit trees zinc alone has given definite response (7). It was thought, therefore, that little-leaf was due simply to a zinc deficiency in the soil, but further experimental evidence has shown that other factors are probably involved and that soil micro-organisms may play an important part, perhaps, in influencing the availability of zinc to the trees (2).

In greenhouse experiments, Hoagland and others showed that "little-leaf" soil had a toxic effect on a number of plants and produced typical little-leaf symptoms in apricot seedlings. Hoagland, Chandler, and Stout (8) showed that by sterilising certain soils healthy maize plants could be grown, whereas prior to sterilisation the soil produced little-leaf affected plants. The addition of small amounts of unsterilised "diseased" soil to the sterilised soil resulted in the re-establishment of toxic conditions, which could be overcome subsequently by the addition of zinc sulphate. These observations were confirmed by Ark (2), who made bacterial cultures from "little-leaf" soil. When two types of these bacteria were inoculated into soil or sand cultures in which peach or walnut seedlings were growing, symptoms very similar to those of little-leaf appeared, but their development was preventable when zinc sulphate was present in the culture. In Victoria (10) the application of 15 lb. of zinc sulphate per acre with superphosphate resulted, in certain districts, in a marked improvement in the growth and yield of wheat on land which was infected with root fungi and eelworms. The evidence suggested that the presence of the zinc sulphate enabled the plants to withstand the effects of these organisms.

All of this work indicates a potential relationship between little-leaf, zinc supply, and soil micro-organisms. Other work has suggested that zinc availability is associated with soil acidity (1). It still remains to be explained why the action of certain cover crops, such as lucerne, among trees affected with little-leaf will cure or reduce the disease (3), and why trees growing on sandy soils are so subject to the disorder.

That zinc may play an important role in the life processes of plants is made evident by much research, including that of Reed and Dufrenoy (12), who found when working on mottle-leaf of citrus that in the mottled leaves cytological and physiological development were seriously disturbed, and that spraying such leaves with zinc sulphate produced important changes which led to the recovery of the leaves.

Whatever the ultimate cause of little-leaf may be, it has been amply demonstrated that supplying zinc to affected trees results in a partial or complete cure. From the economic point of view the most pressing problem is to find the most effective method of supplying zinc to the different varieties of fruit trees, since all the varieties do not respond uniformly to the same method. Various treatments of deciduous trees have been investigated by several workers, notably Chandler and his associates in California. The results of this work are briefly as follows.

Soil Dressings.—In acid soils a few pounds of zinc sulphate has effected a cure in some varieties, but in alkaline soils so much zinc is quickly rendered unavailable that very heavy dressings are required to produce results. In these latter circumstances, acid substances, such as iron sulphate, may prolong the period of availability of the zinc. In general, it would appear that soil dressings are too expensive for most practical purposes.

Foliage Sprays.—The use of zinc sulphate with sufficient lime to prevent injury has given a measure of response on apricot trees which were affected with little-leaf to a mild degree but usually the effect has been manifest for a few months only, and such sprays will not cure badly affected trees. Further, other deciduous fruits have not responded satisfactorily to the treatment. The use of lime seems to have a tendency to reduce the effectiveness of the zinc sulphate. It is considered that rain, dew, and fog are important factors in bringing about any response from this treatment since they probably assist in the transport of the zinc into the plant tissues. Chandler (5) states that apple, peach, and plum have responded to all methods of treatment except spraying the foliage. Foliage sprays with the zinc-lime mixture have, however, given striking results when used on citrus trees to control mottle-leaf.

Dormant Sprays.—The use of strong solutions of zinc sulphate in water, without lime, has resulted in satisfactory response on apple, peach, and plum. The duration of response to this treatment is relatively longer than with some other treatments, and it is considered to give the quickest results. It has not been tried extensively on apricots and pears, but is thought to offer the most promising measure for these fruits. Swabbing the wounds of grapevines with a strong zinc sulphate solution immediately after pruning has given excellent results when the pruning is done before the vines will bleed.

Zinc Pieces Driven into the Tree.—This treatment consists of driving pieces of zinc, zinc-coated nails, or galvanised iron into the bark of affected trees, and has shown promising results with walnut, grapevines, and other fruit plants. The method is slow in action but, provided that the pieces do not fall out, it is considered that it should be effective for several years.

Cover Crops.—The growing of lucerne among little-leaf trees in the States of Washington and California has reduced the amount of little-leaf in apple, grapevine and stone fruits over a period of years. The means by which this is brought about has not yet been fully explained.

Injections.—The injection, for experimental purposes, of very dilute solutions of zinc sulphate into affected trees has produced satisfactory responses. A more commonly used method of injection has been to place dry zinc sulphate, zinc oxide, or zinc dust into holes bored into the trunk of the tree. In order to avoid serious injury the material must be placed in the hole so that none is left on the outer sapwood or bark. This method has produced beneficial results, and is considered to be useful in experimental work.

With reference to the occurrence of little-leaf in Australia, it has been reported by Barnard (4) that conditions resembling little-leaf exist in Western Australia, South Australia, Victoria, and Queensland, and he considers they are all comparable and probably represent the same disorder in varying degrees of intensity. They are variously termed "pruning dieback" in Western Australia, "dieback" in South Australia and Victoria, and "little-leaf" or "rosette" in Queensland. It is stated that the disease differs in severity in the different States, ranging from minor importance in Victoria to the most serious form of dieback in the Stanthorpe district. Investigational work on the disorder has not yet been published from Australian States other than Queensland, where, in 1937, it was shown that a spraying in autumn with zinc sulphate, lime, and water (10 lb., 5 lb., and 100 gallons) resulted in growth responses in the following spring (11).

SUMMARY.

Little-leaf, a functional disorder of apple trees, is of major importance in the Stanthorpe district, where it results in the complete suppression of terminal growth, followed by dieback, on individual branches or on whole trees.

Symptoms of the disorder are most noticeable in spring, when the development of the foliage on affected shoots or branches is delayed, and leaf growth is markedly reduced, resulting in the formation of rosettes of small leaves in the place of normal foliage and normal shoot growth.

Previous investigations have demonstrated that the disorder can be remedied by supplying zinc to affected trees. Extensive experimental work of a quantitative nature has therefore been undertaken at Stanthorpe to find the most practicable means of supplying zinc to apple trees growing under a variety of conditions. The various treatments under investigation include foliage and dormant-period sprays, soil dressings, and tree injections.

After one growing season, definite response has been obtained only on those trees which received a dormant spray consisting of 50 lb. of zinc sulphate in 100 gallons of water. This treatment was applied in July, and response was observed in the following October. Other treatments did not show any consistent response in the season following their application, but it cannot be inferred that all these other treatments will continue indefinitely to show no beneficial effects. It is felt that further positive results may be obtained from several treatments during the 1938-39 season.

The question of the relation of zinc sulphate sprays to certain spray mixtures used in treating pests and diseases of apple trees is briefly discussed.

Some of the most important overseas research work on the little-leaf problem is reviewed.

BIBLIOGRAPHY.

1. ALBEN, A. O., and BOGGS, H. M. Zinc content of soils in relation to pecan rosette. Soil Science, Vol. 41. 1936.
2. ARK, P. A. Little-leaf or rosette of fruit trees VII. Soil microflora and little-leaf or rosette disease. Proc. Am. Soc. Hort. Sci. for 1936, Vol. 34, pp. 216-221. 1937.
3. BALLARD, W. S., and LINDNER, R. C. Studies of little-leaf disease in California. Proc. Am. Soc. Hort. Sci. for 1934, Vol. 32, pp. 1-10. 1935.

4. BARNARD, C. Survey of dieback and sour sap of apples. Unpublished report presented to horticultural conference. Melbourne, 1937.
5. CHANDLER, W. H. Treatment with zinc for little-leaf of deciduous orchard trees. Leaflet California Agric. Expt. Station. Undated.
6. CHANDLER, W. H., HOAGLAND, D. R., and HIBBARD, P. L. Little-leaf or rosette of fruit trees IV. Proc. Am. Soc. Hort. Sci. for 1934, Vol. 32, pp. 11-19. 1935.
7. CHANDLER, W. H., HOAGLAND, D. R., and HIBBARD, P. L. Little-leaf or rosette of fruit trees III. Proc. Am. Soc. Hort. Sci. for 1933, Vol. 30, pp. 70-86. 1934.
8. HOAGLAND, D. R., CHANDLER, W. H., and STOUT, P. R. Little-leaf or rosette of fruit trees VI. Further experiments bearing on the cause of the disease. Proc. Am. Soc. Hort. Sci. for 1936, Vol. 34, pp. 210-212. 1937.
9. KADOW, K. J., and ANDERSON, H. W. Further studies on zinc sulphate in peach sprays. Illinois Agric. Expt. Station Bull. 424. 1936.
10. MILLIKAN, C. R. A preliminary note on the relation of zinc to disease in cereals. J. Agric. Vic., Vol. 36. 1938.
11. MORWOOD, R. B. Little-leaf of the apple. Qld. Agric. J., Vol. 48. 1937.
12. REED, H. S., and DUFRENOY, J. The effects of zinc and iron salts on the cell structure of mottled orange leaves. Hilgardia, Vol. 9. 1935.

THE USE AND VALUE OF TREES.

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—*J. C. de Klerk in Farming in South Africa.*

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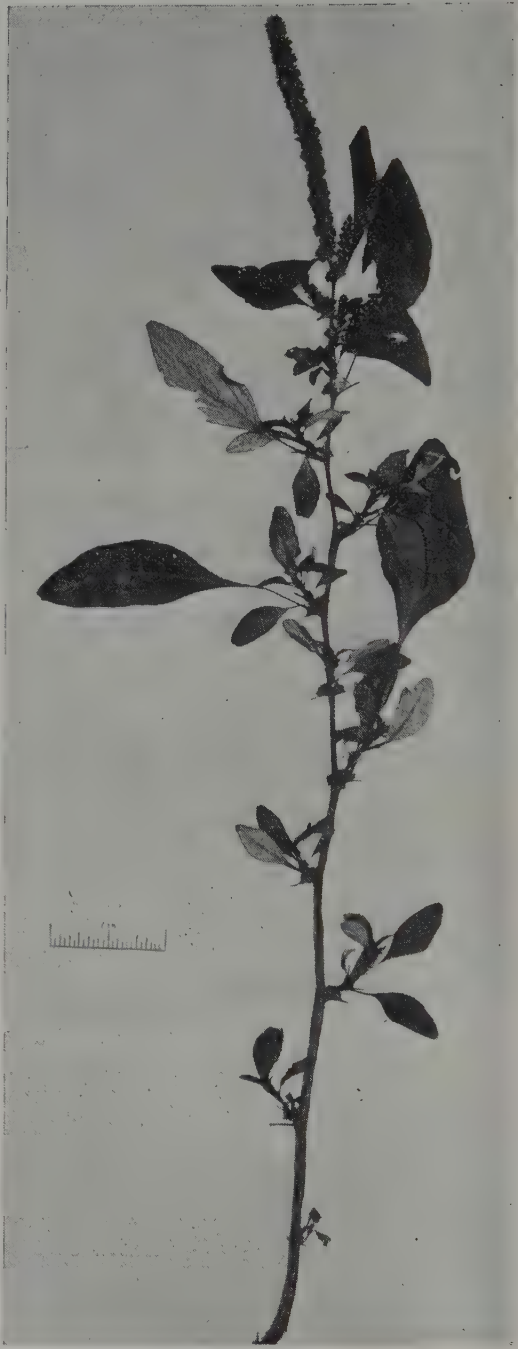
A Noxious Weed—The Needle Burr.

W. D. FRANCIS, Botanist.

THE Needle Burr or Spiny Amaranth* has been declared a noxious weed throughout the State by a notice in the *Government Gazette* of 25th February, 1939. The accompanying description and illustration (Plate 180) are published to assist all interested persons in recognising the plant.

This noxious weed is an annual plant which grows to a height of 1 to 4 feet. Its leaves are usually dark-green, but they are occasionally red in colour. The stems are often green, but on the other hand they are frequently red, and they are furrowed or grooved. The leaves are placed alternately on the stems, and the leaf stalks are $\frac{1}{4}$–$\frac{3}{4}$ inch long. The leaf blade is lance-shaped, with a blunt point, which, however, is furnished with a fine bristle at its apex. The leaf blade, which is $\frac{3}{4}$–2 inches in length, is narrowed into the leaf stalk at its base, and the midrib and primary lateral nerves are prominent. The spines which give the plant its common name arise from the forks of the leaves and vary in length from $\frac{1}{8}$–$\frac{3}{8}$ inch. The inflorescence is straw-coloured, and is situated in the forks of the leaves, where it forms rounded groups or clusters of flowers, and it also forms long spikes at the ends of the branchlets. The small flowers are interspersed with sharp-pointed bracts which are $\frac{1}{10}$–$\frac{1}{6}$ inch in length. The individual flowers measure about



[Photo.: Depart. Agric. and Stock.

Plate 180.

Needle Burr or Spiny Amaranth (*Amarantus spinosus*), which has been declared a noxious weed throughout the State.

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* *Amarantus spinosus.*

$\frac{1}{10}$ inch in length and consist of five sepals enclosing five stamens in the male flowers and a single one-celled ovary in the female flowers.

The Needle Burr is a native of tropical America. It is now widely spread in Queensland, particularly in coastal localities from the New South Wales border to Cairns.

IMPORTANCE OF PASTURE MANAGEMENT.

Pastures—both natural and sown grasses, as well as native herbage—form the foundation of the wool, fat lamb, beef, and dairying industries. Grass, regarded as a crop, is, therefore, our most important crop.

Developments in grass land improvement in recent times have proceeded along very sound lines. There has been a great improvement in pasture management methods. Rotational grazing is more widely practised, and grass conservation has become a matter of regular seasonal routine on many well-managed properties.

These developments, however, have been chiefly in the regions where 20 inches and upwards is the annual rainfall registration. Comparatively little grassland improvement has been practicable in districts of lighter or low rainfall. But obviously any developments which are possible in regions of more or less scanty rainfall would mean a lot to the grazing industry, the wool industry especially.

The rational development of grasslands, especially in districts of moderate or low rainfalls, is governed by five fundamental factors; and these factors are:—First of all, the classification of grass country into clearly defined regions based on the amount and incidence of the rainfall, length and nature of the growing season and soil type. Secondly, it is important to determine the species and pasture mixtures most suitable for these regions. Thirdly, there is the need of developing by selective breeding of improved strains of grass species found to be most suitable in each district. Fourthly, fertilizing where that is practicable and reasonably economical. And, fifthly, improvement in methods of pasture management.

Rotational grazing, which allows for resting periods during which grass makes substantial growth is one of the important principles in pasture management. Stock thrive better and suffer less from worms and other parasites when they are frequently moved on to fresh pastures. The real point is that rotational grazing enables the highest yield of pasture to be obtained with the fullest possible utilization of the pasture.

The intensive system of rotational grazing based on what is called the "short bite," and which is practised largely in the older countries, has, however, not achieved the results expected of it in Australia. But even in the countries where growth of grass is more or less continuous throughout the year, this intensive system is not altogether satisfactory. But rotational grazing, with reasonable rest periods for the growth of grass is essential for the best use of the type of grass swards produced under Australian conditions, because of the need for pasture plants—that is grass and herbage—to provide adequate reserves of nourishment to support a vigorous top growth.

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Some Observations on Dairying in Britain.

E. B. RICE, Dairy Technologist.*

DAIRY farming is carried on in Britain in practically every county under a great diversity of conditions, and, therefore, in giving some impressions of the industry, it will be appreciated that an attempt can only be made to present a general outline of the main practices operating and that only brief reference can be given to each subject dealt with. It is hoped, however, that some insight will be given into the vast magnitude of the dairying industry, and of agriculture, in a country which is often regarded in Australia as primarily industrial.

Breeds of Cattle.

The dairy cattle population of Britain numbers over 3,000,000, a figure considerably in excess of that of the combined total of the dairy cows in all the Australian States. The production per head, too, is much greater than that of Australian cows, probably averaging about 600 gallons per year. Because of the density of the population of Britain there is a huge demand for milk for human consumption, surveys having shown that two-thirds of the milk is utilized for this purpose. Since so much milk is required for supplying the requirements of the liquid milk market, it naturally follows that the most popular breeds of cattle are those which supply a large quantity of milk. The Dairy Shorthorn is the predominant breed, owing its position to the fact that the animals can be fattened for beef when their milk yield declines through various causes. Next in numerical strength comes the Friesian breed, another noted heavy milk-producing breed. Although these two breeds greatly outnumber others, there are many different breeds encountered, certain of which are often reared in their native districts for sentimental reasons. A few cows of the Channel Island breeds are kept on many farms specializing in other breeds in order to maintain the colour and richness of the milk supplied to customers, while many farmers specialize in these breeds. The Guernsey cows, in fact, are often nearly as large and as heavy producers as the Shorthorns.

As an indication of the numerous breeds to be met with, I might enumerate the classes for which trophies were offered at the Royal Counties Show at Reading which I attended in July, 1937. These were Shorthorn, Jersey, Guernsey, Friesian, Devon, Sussex, Aberdeen, Angus, Dexter, Red Poll, Kerry, Ayrshire, Lincoln Red, Welsh Black.

In my tour of the dairying districts of Scotland, I visited the Ayrshire district, which is a noted cheese-producing area. It was a fine sight to see the Ayrshire cattle, which predominate there, grazing on the green hills. This breed shows special adaptability on the exposed, rugged hills of its native land.

Costs of Upkeep of Dairy Cattle.

In a country where hand feeding has to be practised for a period of about seven months in the year, and where land values are high, the

---

* Mr. Rice returned last year from a course of instruction at the Dairy Research Institute, Reading, England, and which was sponsored by the Department of Agriculture and Stock by direction of the Minister, Hon. Frank Bulcock. This article is a record of some of his impressions of visits to various parts of Great Britain in which dairying is a major industry.

Plate 181.

A Jersey Cattle Parade on Jersey Island.

animals to be profitable must produce high yields compared with cows kept under the grazing dairying conditions in most parts of Queensland. Some valuable data on the costs of upkeep of dairy cattle have been collected by the various County Agricultural Committees and the information contained in the following paragraphs should be interesting to Queensland farmers. In an inquiry carried out on fifty-eight farms in the Reading area in 1935-36 the average cost of keeping a cow for the year was £24 4s. 11d. More than half of this was represented by feeding costs, amounting to £13 15s. 4d. per cow, which were made up as follows:—

	£	*s.*	*d.*
Purchased foods	6	13	10
Hay and roots	4	18	11
Grass	2	2	7
	£13	15	4

It is evident that costs, especially of feeding, have to be carefully watched and, as soon as the yield of an animal declines below a profitable level, it must be disposed of for beef.

Much attention is also being devoted to grassland management, the farmer being urged to consider grass in the same light as any other crop, it being the cheapest and most important raw material on the farm, and to use improved husbandry in its culture. In the investigation on the above farms it was calculated that a cow yielding 600 gallons of milk consumes 4,019 lb. starch equivalent (a measure of nutritive values of foods), every pound of which fed via grass costs 0·58d. and via other foods 0·96d.

The Reading inquiry also showed the average costs of producing 1,500,000 gallons of milk on the fifty-eight farms to be—

	Average Cost (pence per gallon).
Foods	5·4
Labour	2·4
Sundries	1·3
Herd maintenance	1·2
Gross farm costs	10·3
Less Credits	0·8
Net farm costs	9·5

Another investigation made throughout England and Wales by economists showed the mean cost of milk production to be 9·32d. per gallon, the average being 11·96d. in winter and 7·30d. in summer.

Life of Cows in a Herd.

Through various causes the number of cows removed yearly from a British herd must be regarded high in comparison with Australian herds. Computations made at the National Institute for Research in Dairying, Reading, England, from estimates furnished by investigators in nine districts scattered throughout England, covering over 86,000 cows, showed the productive life of a cow in one herd to average

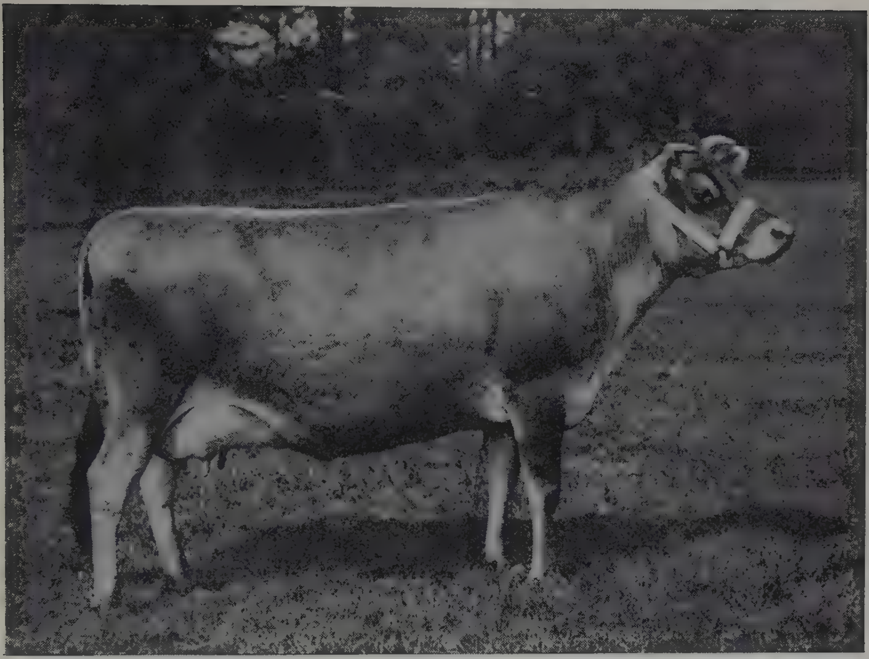


Plate 182.
A Jersey Heifer on a farm in Sussex, England.

Plate 183.
Type of Jersey Cow on a dairy property in the South of England.

3·5 years. The causes of the disposals, which were obtained in some surveys, are set out below in tabular form:—

Cause.	Disposals.	
	Per 100 Cows Yearly.	
Trade	3·4	7·6
Low milk yield	4·2	
Sterility	6·1	16·3
Abortion	0·7	
T.B., Johne's disease, wasters	3·1	
T.B. test reactors	1·2	
Udder troubles	1·6	
Sundry diseases	1·2	
Accidents	0·4	
Old age	0·9	
Miscellaneous causes	1·1	

Calf Rearing and Management of Young Stock.

Calving time for most of the cows is in the autumn, the object being to have the largest number of cows in full profit during the winter in order to maintain uniformity of production throughout the year. This is, of course, essential on farms where milk selling is the chief objective. Heifer calves of larger breeds, like Shorthorns and Friesians, are sometimes left with the cow for seven days, while those of smaller breeds, like the Channel Island cows, are left for ten days. Then for three to four weeks they are fed on whole milk, after which a little good hay is supplied and a little dried cake and meal mixture, the wholemilk gradually being reduced. By the eighth or ninth week the milk is stopped entirely and the feeding consists of cake and meal mixture, good hay and water. On other farms the calves are fed wholemilk up to eight to nine weeks, then gruel or proprietary calf meal. Under such conditions about 60 to 100 gallons of milk are consumed before the calf is entirely fed on other foods, so that calf rearing becomes an expensive item. Again, on some farms a number of cows are set aside solely for providing milk for calf raising, while other farmers prefer the cow to suckle the calf, under which system it is weaned at about eight to nine weeks. Proprietary calf nuts or meals are being increasingly used and are often fed in the form of a dry meal, the milk or water being given separately. Some farmers feed gruels made up from such meals, but the dry meals are less trouble and prevent the common pot-bellied appearance of gruel-fed calves. Mating of heifers takes place at about eighteen to twenty-one months of age, so that the first calf is dropped when the animal is about twenty-seven to thirty months old.

Bulls.

It will be appreciated that the necessity to regulate calving times of the cows makes it imperative to keep the bulls separated from the remainder of the herd. In my travels, I do not remember having seen a bull roaming at large with the cows. All bulls were obviously of high quality, for to keep a "scrub" would be disastrous where high yields must be carefully safeguarded. Although progeny recording of bulls has not received the same prominence as it has in Denmark, there

Plate 184.
The Pride of a Jersey Herd, Sussex, England.

Plate 185.
The Head of a Jersey Herd on an English Farm.

appeared to be an awakening to its possibilities and provision is now being made on the forms furnished by the Milk Recording Societies for the inclusion of the requisite information for compiling a "bull index."

Dairy Buildings and Appointments.

Under the open-air dairying system practised in Queensland a comparatively simple structure meets all requirements for a milking shed, but in England, where for practically half the year the cows remain continuously indoors, substantial buildings in which feeding and milking can be carried out, are needed. The types of dairy buildings and standards of shed sanitation vary considerably, but on the better farms the dairy appointments are exceptionally good, and embody the most modern features of hygiene in respect of ease of cleaning, lighting, ventilation, and pure milk production. Tubular steel fittings are commonly employed for the cows' standings and in many sheds automatic water-drinking bowls are fitted for each cow. Steam sterilizers are used on all the better farms, and, where bottling is done on the farm, a small refrigeration plant is fitted in the dairy.

In spite of its disability of coldness in northern latitudes, where the cows have to lie on it for long periods, concrete has not yet been surpassed for cowshed floors, because of its many compensating features, such as imperviousness, cheapness, life, strength, &c. A bedding of straw is, of course, used on it when the cows remain indoors. At the Hannah Dairy Research Institute, Ayr, Scotland, I was shown a rubber mastic floor which had proved satisfactory in all respects and possessed the special advantage of being warmer than concrete.

In the South of England there has been a tendency in recent years to depart from the practice of keeping the cows indoors in the colder months. A system, known as the Hosier Open Air System of Dairying, has received the support of a number of farmers. Its essential features are that the cows are kept outside, day and night, throughout the year. They are rugged on winter nights and, perhaps, on very cold days. Milking is done in a portable bail type of building very similar to the ordinary bails used in Queensland, but which is always equipped with a milking machine, and which is frequently moved from place to place on the fields. The advantages claimed for the system are that much of the outlay on expensive buildings is avoided, labour costs are much reduced because of the ease of cleaning the shed and machine milking, soil fertility is improved by the spreading of the manure on the fields where it accumulates, disease is less rife than if cows are kept closely confined in a shed for a lengthy period, and general health is better. The milk yield is also undiminished. These claims have been substantiated by official investigations, and, no doubt, the system will receive more extensive adoption on certain farms peculiarly suited to it in the milder climatic parts of the country.

Feeding.

Feeding of dairy cattle in Britain and European countries is highly scientific at the present time, and particularly during the period of stall feeding can accurate quantities of nutrients be fed. This is not nearly so easy to accomplish under Australian conditions, where, normally, stock are out on pastures the whole year round, and practically only during droughts has hand feeding to be resorted to. Again,

Plate 186.
Picturesque Thatched Farm Buildings on an English Estate.

Plate 187.
Entrance to Ovaltine Model Dairy, England.

under Australian conditions, where the price received for cream for buttermaking and the cost of purchased foods may not render it economical to feed concentrates to the extent that they are used in other countries, too much emphasis cannot be placed upon the importance of pastures and fodder crops in dairy cattle feeding. Under English conditions the period of summer feeding out on the pastures is from May to October. For about four months in the summer grazing period the cow may be receiving an adequately balanced ration from the pastures alone, but at the beginning and also at the end of the summer it is often found necessary to supplement the pastures with concentrates and green fodders.

Plate 188.
Dexter Cattle on a Farm in England.

During the winter, when there is an almost complete stoppage of pasture growth, hand feeding is adopted entirely. The usual basis of winter rationing is to divide the food required by the animal into the maintenance and production portions. The maintenance ration, made up of bulky, starchy foods, is required to replace wastage of tissue, provide the energy for bodily requirements, &c., and the production ration, which consists of concentrates and grains, chiefly supplies the needs for milk production. The maintenance ration usually consists of hay, roots (mangels, swedes, turnips), silage, cabbage, kale, sugar beet tops, and straw, although with the conversion from arable to grassland farming, straw is now used in much lesser quantities than a decade ago. The use of roots, too, has declined in popularity, for, though beneficial to milk yield, they can be entirely replaced by hay, and present labour costs restrict the areas planted for root growing. Hay is the foundation of the maintenance ration on almost every farm, and haymaking is regarded, as in all European countries, as a most important farm operation. There is almost certainly a greater variety of concentrated foods available than in any other country, some of the products which are used being oats, bran, dry grains, cottonseed cake or meal, maize gluten feed, linseed cake or meal, dried brewers' grains, palm kernel cake, bean and pea meal, soya bean meal and cake, coconut cake, rice meal, barley meal, dried beet pulp, meat and fish meals. Proprietary concentrate cakes and nuts have acquired great popularity because of the simplicity of rationing when they are used, and are usually fed at the rate of 3 to 3½ lb. per gallon of milk yielded.

Rye grass-clover mixtures are the chief pasture grasses, other grasses grown extensively being cocksfoot and timothy.

Plate 189.

A TYPICAL ENGLISH FARM.—A picturesque scene on the Wiltshire Downs. Guernsey cattle on their way to pasture after the morning milking.

To illustrate typical examples of the feeding methods followed in the country, the practices adopted on four of the farms visited are outlined below:—

Farm No. 1.—At this farm proprietary concentrates were fed all the year round at the rate of 3½ lb. per gallon of milk yield in winter and 2 lb. per gallon of milk to cows on grass. The winter maintenance ration was:—

10 to 12 lb. hay;
14 lb. chop (cabbage, green maize, silage) from October to Christmas; or
12 lb. chop (kale, straw or hay) from the end of September to February;
7 to 10 lb. roots (mangels) from Christmas to end of spring (April).

Farm No. 2.—Feeding methods on this farm were extremely simple for English conditions. Hay alone (no roots, no kale) was fed for maintenance in winter, together with a proprietary cake concentrate, according to milk yield, for the production ration. When the cows were out at grass in the summer concentrates were not given.

Farm No. 3.—In the early part of the summer grazing period the pasture was supplemented by maize and oats or maize and cottonseed cake. Cows giving less than 4 gallons of milk were not fed any supplements in May and June, when the pastures were at their maximum nutritive stage. As the summer advanced, estimates were made from time to time of the quantity of nutrients that the animals were thought to be receiving from the pastures, and supplementary feeding was arranged accordingly; for example it may be estimated at one time that the grass is capable of providing maintenance and producing 2 gallons of milk. Then cows yielding over 2 gallons have additional protein concentrates fed to them. Later, the grass may be considered only capable of maintenance and the production of 1 gallon of milk, and a revised ration, according to this estimate, is fed, and so on, until the full winter rations are again being given.

Farm No. 4.—The winter feeding usually consisted of a maintenance ration of—

14 lb. hay;
7 lb. oat straw chaff;
56 lb. mangels.

For the production ration the undermentioned concentrates mixture was fed:—

	Per gallon of milk yield.
Decorticated cotton cake	1 lb.
Maize meal	1 lb.
Maize gluten feed	1 lb.

The area of grazing land on this farm was limited, so during summer the pasture was supplemented by 30 lb. per head per day of green forage crops, and an allowance of concentrates was given to any cows which were considered to be receiving sufficient nutrients for full production from the green foods available (cows yielding over 3 gallons of milk daily).

Grass Drying.

Two innovations in cattle feeding which were attracting interest during my stay in England were grass drying and a new method of making silage, known as the A.I.V. process.

Trials with grass-drying machines were made at the National Institute for Research in Dairying, and three machines were in operation when I visited the Hannah Dairy Research Institute, Ayr, Scotland. At these institutes much practical information on the process and on the feeding value of the dried product has been collected over a period of years. Briefly, the object of drying grass is to cut, dry, and so preserve the pasture growth at its maximum nutritive stage; that is, when about 4 to 6 inches high, as experiments have shown that, irrespective of variety, the protein content of grass at this stage approximates that of a protein-rich concentrate. The mineral and vitamin contents of the young grass are also largely retained by the process. Practical feeding experiments have confirmed the scientific data concerning the nutritive value of dried grass, and cattle can readily be induced to eat it. In fact, at one large model dairy in Stratford the owner has replaced purchased concentrates entirely by grass grown and dried on his property. In Britain, where the cows have to be hand fed in the byres for from five to seven months each year, it is hoped that grass drying will pave the way for more economical feeding and help to retain in the country a portion of the huge sums which annually go to foreign countries for the purchase of concentrated feeding stuffs. The process is still in the experimental stage, the cost of drying is high, and the capacity of the machines limited, but mechanical improvements can almost certainly be expected. An advantage under English conditions is that the operations can be carried on in almost any weather. The opinion of most authorities is that artificial drying of grass appears to offer good possibilities in Britain.

A.I.V. Silage.

The new method of making silage, called the A.I.V. process, was devised by Professor A. I. Virtanen, of Valio Dairies, Finland, whose lecture before the Pasteur Club at Reading University I had the privilege of attending. The method has been taken up enthusiastically on the larger farms in Denmark, Finland, and other Continental countries, and trials have been made with the process in Britain. The essential difference between A.I.V. and ordinary silage depends upon the addition of a dilute solution of acid to the material being ensiled for the purpose of adjusting the acidity to a point (pH 4·0) which checks plant respiration and certain types of bacteria which deteriorate silage, but does not inhibit the desirable fermentation by the lactic acid bacteria. Apart from resulting in a decreased loss of material compared with the ordinary methods, it is claimed that the nutritive value, particularly the protein content, of silage made by the process is greater.

Plate 190.

Cowshed, National Institute for Research in Dairying, Reading, England, with silo in the background. The building on the right is an experiment factory.

Milk Recording (Herd Testing).

Milk recording was not adopted in England until many years after it was firmly established in Denmark, and, in fact, it was not until the years just preceding the World War that interest began to be shown in the matter. In 1914 the Ministry of Agriculture organised the formation of societies and made money grants in aid of the work.

Progress was naturally impeded in the war years, but steady improvement has taken place since. About 5 per cent. of the cow population is now included on the books of the societies, but there are wide variations in the numbers of cows under test in the various counties, as high as 25 to 30 per cent. of the total number of cows in certain counties being recorded. It is compulsory for a farmer wishing to undertake recording to enter the whole of the members of his herd, and records are taken, not over a lactation period, but over a whole year. The milk recording year is from the evening of 1st October in a year to the morning of 1st October in the succeeding year. It is only natural, too, in a country where milk selling is the chief aim of most dairy farmers, that greater importance is attached to milk yield than to butterfat production, but provision is made for recording butterfat production as well as total milk yield. Under English conditions the information derived from the records, in addition to enabling the farmer to identify low-yielding cows for culling from the herd and high producers from which to select for breeding purposes, is also of great value in the rationing of the herd and for denoting the influence of changes of food on milk yield. On most farms the rule is to keep daily records of yields and for butterfat, if recorded, samples are taken by

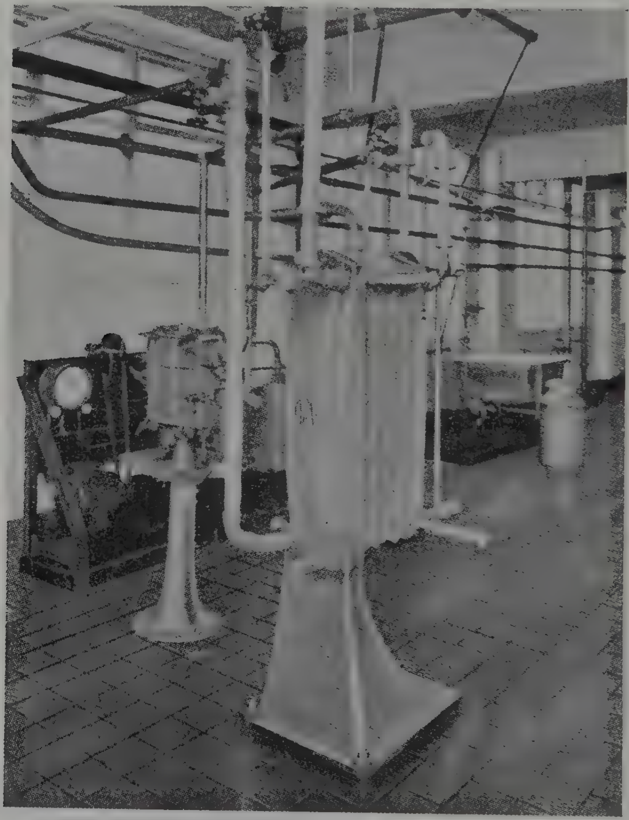


Plate 191.

A pasteurizer in a London dairy.

the recording officers once monthly. On certain farms permission is given for the milk of each cow to be weighed once weekly. The Milk Recording Scheme has the official recognition of the Ministry for Agriculture, which also assists by means of money grants, but the actual work is carried out by Milk Recording Societies, which exist in practically every county. The societies employ the recorders, tabulate and calculate the results, &c. Members of the society pay an annual subscription and an annual levy per cow. As previously referred to, the records now provide information which can be used for progeny testing of bulls, or, as it is often called, bull indexing.

The scheme also provides a service for the registration and marking of bulls and calves, the actual marking being done by the recording officers.

Plate 192.

Milking time in a modern English dairy. Note the bucket machines in operation.

Buttermaking in England.

Whereas in former years butter was usually made on the farms, there has in recent years been a rapid change to factory buttermaking with the result that the farm-made product is now being largely replaced by the factory product. The expansion in factory buttermaking has taken place throughout the country, but has been carried out on the largest scale in Cornwall and Devonshire, counties which are far removed from the thickly populated industrial districts, where, naturally, the surrounding farms are practically all engaged in producing milk for city requirements. The Milk Marketing Board, which controls the marketing of practically all milk produced in England and Scotland, and proprietary companies, have erected many large factories in various districts.

The type of butter produced in most of the English factories, especially in the South, is not starter-ripened to give a full-flavoured, acid butter resembling Danish in characteristics, but is made from milk delivered daily to the factory, where it is separated, pasteurized, and the cream churned into a mild-flavoured butter more like Australian. Except for the delivery of the fresh milk from the farms for separation at the factory, the system of butter manufacture does not depart very widely from that followed in Australian factories; in a few remote dairying centres farm separation is practised, but it is only exceptional and not the general practice that it is in Australia.

Milk is paid for according to its fat test, but, as yet, different rates of payment based on the hygienic quality have not been introduced. Butter grading, too, is not compulsory, but creameries (as the factories are called) may join a voluntary scheme inaugurated by the Ministry of Agriculture—the National Mark Scheme—and products entitled to use this mark must satisfy certain standards of purity and quality. The possession of the mark is, therefore, really a Government guarantee of quality, and people are being educated to ask for National Mark products. Samples of butter from participating creameries are taken at regular intervals by the Ministry's officers and forwarded to the British Dairy Institute, Reading, for grading and scientific examination. The butter is graded upon arrival and is then held for ten days at a temperature of 60 deg. F. when it is re-examined to determine its keeping quality at ordinary temperatures.

It is hardly within the scope of an article of this nature to deal with the many complex factors associated with butter marketing in Britain, but it is felt that reference should be made to the advocacy sometimes urged for Australian manufacturers to attempt to copy Danish methods of butter manufacture. Apart altogether from the technical difficulties which prevent this at the present time, there is, it is contended, no further proof needed of the fallacy of the suggestion than the fact that in most English creameries a mild butter, like Australian, is manufactured. In the South of England, representing roughly half the population, this type of butter is most sought after, whilst in the North and in Scotland, consumers, through long association with Danish butter, prefer its fuller flavour, except in Manchester, Liverpool, and Glasgow, where Danish type and Australian type butters are sold in roughly equal quantities. Danish butter is actually shipped to the Northern ports and not to London and Southern ports. At the present time, all Australia's butter exports are finding a ready market in the South where it is preferred.

Margarine.

It is intended to digress from the subject proper once again to refer to the sale of margarine in Britain. Large quantities of this product are consumed and its competition must always be borne in mind, for it is likely to continue as a factor influencing butter prices. There is a section of the British public which can only afford to pay a certain price for butter and must resort to the use of substitutes if the price soars above their limited capacity to buy this article of food. Some years ago large quantities of margarine were consumed, the total weekly tonnage of margarine and butter eaten by the English people being about 5,000 of each. When the price of butter crashed in the depression years and it had to be sold at a sacrifice to clear stocks, many people who hitherto used to buy only margarine changed over to butter. In spite of the efforts of the margarine manufacturers, by extensive advertising, colouring of their product to look like butter, adding to it the essential butter flavour and certain vitamins, and improving its spreading quality, they have not been able to recapture their lost market, and it is estimated that there are now about 9,000 tons of butter and 3,000 tons of margarine sold weekly.

Butter and margarine prices in retail shops vary from time to time, depending upon the seasonal fluctuations of imports. About the time of my arrival, some prices in London were:—

Margarine—slightly salted, 5d., 6d., and 8d. per lb.

Butter—dairy, 11d., New Zealand 1s., Empire 10d., Danish 1s. 1d.

Cheese and Cheesemaking.

As with buttermaking, so there has been a change over in recent years from farm to factory cheesemaking, though much cheese is still made on the farms; this is especially so with varieties other than cheddar. The increased milk supplies needed for human consumption, as a result of the Milk Marketing Scheme, have contributed largely to the decline in farm cheesemaking, while much of the surplus milk from the liquid milk market is now used for factory-made cheese.

Unlike in Queensland, where practically only one variety of cheese—cheddar—is made, there are numerous varieties produced in Britain. Most British cheeses take their name from the particular district in which their manufacture originated, and they are even at the present time made in most of those districts, sometimes exclusively, the principal varieties being Cheddar, Cheshire, Leicester, Stilton, Wensleydale, Derby, Lancashire, Dorset Blue, Gloucester, Dunlop, Caerphilly, and cream cheeses. Many cheeses of foreign origin are also made in limited quantities in England, such as Roquefort, Camembert, Gorgonzola (blue veined cheeses of French and Italian origin), Edam and Gouda (Dutch hard cheeses), Gruyere (Swiss), Coulommier, Gervais, Pont l'Eveque (French).

About 10 per cent. of the country's milk production is converted into cheese. Payment for cheese milk is mostly made on a gallonage basis, irrespective of its richness in butterfat, though some factories make differential rates of payment according to the fat content of the milk.

The National Mark Scheme has been extended to include most varieties of cheese. Factories and farms desiring to have their produce graded in accordance with the scheme must apply to the Ministry of Agriculture and agree to comply with the conditions and procedure laid down. Their premises and equipment must be suitable and hygienic, the quality of their product must be constantly maintained, and periodic inspections of the milk supply and process of manufacture are made.

Of the cheese consumed in England about 25 per cent. is British-made and about 75 per cent. imported. Of the total imports foreign countries supply about 15 per cent. and the Dominions about 85 per cent. Foreign countries which export to Britain special varieties of cheese are chiefly Holland, France, Italy, Switzerland, and Denmark. Cheddar cheese in large quantities comes from the Dominions—New Zealand (50 per cent.), Canada (30 per cent.), Australia and South Africa (5 per cent.).

Some interesting information was accumulated in a survey made of London retail stores some years ago. It was then found that more than twice as much white cheddar as coloured was bought in London.

In 500 shops covered in this inquiry, only two kept Australian cheese. However, in the mining and industrial districts coloured and Australian cheese are sold in greater quantities.

The opinions of the London storekeepers were sought concerning customers' flavour preferences. Sixty per cent. of the stores stated their customers preferred mild cheese, while 40 per cent. said that stronger flavoured cheese was preferred.

Milk Production, Testing, and Selling.

There are official dairy bacteriologists, stationed in ten different centres, whose duty it is to examine milk samples taken by authorities charged with looking after the hygienic quality of the milk supply, such as health and medical officers, county councils, veterinary officers, &c. These officials also examine samples submitted by farmers themselves and assist producers to supply a safe, clean milk by instructing them, if necessary, in approved methods of production on their farms. A notable improvement in the hygienic quality of the milk supply has occurred in the past decade as a consequence of the attention focussed on the matter, and, since the advent of the Milk Marketing Board, the payment of a bonus for "accredited" milk. The higher grade milks are often bottled on the producing farms, which are equipped with steam sterilizers for sterilizing equipment and a small refrigerating plant for cooling milk to 40 to 50 deg. F. immediately after it is drawn. The sale of milk in bottles fitted with hygienic metal caps is widespread and, indeed, there is very little other than such milk supplied in the larger cities.

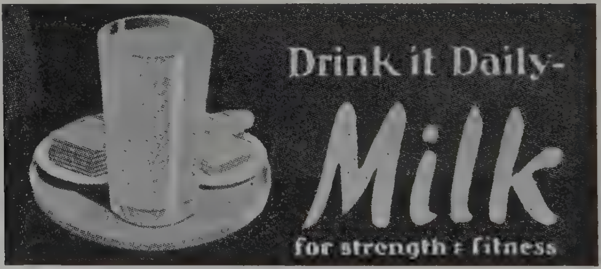


Plate 193.

An example of the simple and effective publicity by the National Milk Council of Great Britain.

Large pasteurizing plants exist in almost every town, and this process is a valuable safeguard, especially of infant life, in a country where T.B. is prevalent in the herds.

Machine Milking.—A few comments on this subject may be of interest. Machine milking is not nearly so common in England as it is in this State, but it is attracting more farmers, largely because of the difficulty of obtaining agricultural labourers, for the drift to the cities is just as marked in European countries as in Australia. The releaser type of machine, almost universally used in Australia, is replaced almost entirely by the bucket type of milking machine which, being less complicated, is easier to maintain in a sanitary condition. Combine-auto recorder machines, rather like the releaser pattern, in which the milk is conveyed from the udder to a glass vessel wherein it is weighed and its weight recorded on a dial, have been perfected in recent years. Their special advantage is that the milk yield of each cow may be recorded daily, which is desirable under English milk-recording rules.

Plate 194.

Belted Galloway Cattle in an English Show Parade.

Milk Standards.

The official standards for milk have been altered recently and reduced in number, and the methylene blue test, which affords an approximate measurement of bacterial numbers, has replaced the plate count for bacteria in raw milk. The simplification of grades was considered to be better than having numerous standards. The grades previously in existence and their chief requirements were:—

Certified.—From herds isolated from other cattle, and tuberculin tested every six months. The milk to be bottled on the farm in bottles sealed with a disc and cap. The milk must not be treated by heat, and the maximum bacterial count permitted is 30,000 per cc., and no coliform bacillus in 1/10 cc.

Grade A (Tuberculin Tested).—Herd to be isolated from other cattle and tuberculin tested every six months. No heat treatment permitted, and bacterial count not to exceed 200,000 per cc., and no coliform bacillus in 1/100 cc.

Grade A.—Cows to be kept separate from other cows in milk and subject to clinical examination every three months. Bacterial counts similar to Grade A (Tuberculin Tested).

Grade A (Pasteurized).—To be pasteurized at a temperature between 145 and 150 deg. F. for thirty minutes, and the bacterial count not to exceed 30,000 per c.c., and no coliform bacillus in 1/10 cc. Other requirements similar to Grade A.

Pasteurized.—Bacterial count not to exceed 100,000 per cc. No specific farm requirements.

MILK MARKETING BOARD

Plate 195.
Butter Factory in Cornwall, typical of the new factories in England.

The Milk Marketing Scheme.

Almost all the milk now produced in England comes under the control of the Milk Marketing Scheme, exemption being granted only to certain producers of certified milk, of whom there are about 2,000. Most of these producers, however, now market their milk through the Board. The Board, which is producer-controlled, commenced operations in October, 1933, having as objectives: (1) Improvement of returns to producers, (2) control and organisation of milk marketing throughout England. The scheme is designed to pay farmers the average price of all milk sold, irrespective of purpose for which it is intended—milk sold for the liquid milk market brings about 1s. 3d., that for fresh cream about 8d., and that for cheesemaking about 5d. or 6d. per gallon. The pool price for milk for whatever purpose it is sold is about 1s. per gallon delivered to the dairy premises, whether butter or cheese factory, pasteurizing depot, &c. Transport charges are thus payable by the individual farmer, and average about 2d. per gallon, so that the average nett return to the producer is about 10d. per gallon. The scheme really provides for a pooling of sales returns, but instead of paying a flat price throughout the country, the return to the farmer varies in different districts in accordance with the proportions of milk utilized for manufacture and for the liquid milk market; but to protect farmers in districts where most of the milk is required for manufacture, the margin between the prices paid in any districts is kept to a maximum of 1d. per gallon. The average retail price paid by the consumer is about 6d. per quart.

The creation of the Board has given a great stimulus to milk production, as, by publicity and other measures, the consumption of milk has been markedly increased since the commencement of operations, until now over 1,000,000,000 gallons yearly pass through the Board's hands. About two-thirds of this immense quantity is used for the liquid milk market and one-third for manufacture into butter, cheese, and condensed milk.

Producers are encouraged to supply a milk of high bacteriological quality, for which they receive a bonus payment of 1d. per gallon over the payment for ordinary grade milk. Approximately one-third of the suppliers to the Board have qualified to receive this payment, and such suppliers' milk is marketed as "accredited" (or Grade A) milk. Other suppliers whose herds are free from tuberculosis (attested herds) also receive this higher rate of payment.

Plate 196.

MAIN LABORATORY OF THE NATIONAL INSTITUTE FOR RESEARCH IN DAIRYING, READING.—The building was formerly an old manor house, dating from the 15th century.

Milk Publicity in England.

With a view to fostering interest in the nutritive value of milk and to encourage its increased consumption, an organisation known as the National Milk Publicity Council was formed some years ago.

Among the many schemes introduced by the Council the Milk-in-Schools Scheme is deserving of special mention. This scheme should have a far-reaching influence on the health, physique, and efficiency of some 3,000,000 school children, who receive on every school day a small bottle of milk containing one-third of a pint. The cost is only ½d. per bottle, and, in necessitous cases, the milk is supplied free of cost.

Satisfactory results have also attended the Milk-in-Industry Campaign, whereby arrangements are made for milk to be drunk during or immediately after working hours. Suitable supplies of milk at the desired hours are arranged in the industrial undertakings and offices wishing to participate in the scheme.

Twelve organisers, together with women lecturers, have been appointed to give lectures and talks to school children, industrial and other workers, and to arrange cooking demonstrations. By the extensive use of newspaper and press advertising, leaflets, posters, films, and shop window displays, further publicity work is undertaken. "Milk weeks" and "cheese weeks" have also been conducted in various towns.

The Fat Lamb Industry in Queensland.

JAS. CAREW, Senior Instructor in Sheep and Wool.

FAT lamb raising is now developing along sound lines in some districts in Queensland, with a result that many prime grade lambs are being marketed. A demand for the suitable age and type lamb and the prices for prime lambs over a series of years have stimulated expansion. This branch of animal husbandry is developing into a major industry on the Darling Downs, especially on the eastern division of the Downs. Other parts of the State, also, are adapted for successful lamb-raising. Any locality with a 25-inch rainfall reasonably well distributed, and suitable conditions otherwise, where the pasture lands are sufficiently good, and where there is enough arable land on the holding for fodder crop production, is suitable for lamb fattening.

Plate 197.
Fat Lambs at Cannon Hill.

If suitable soil is well cultivated, a wide variation in crop production is possible. In this respect Queensland is fortunate in that conditions favour both summer and winter cultivation of several varieties of fodder crops. Where lucerne can be grown for hay, the land is likely to be too expensive for sheep, but there are many localities, not so rich, perhaps, where lucerne can be grown to provide a good fattening fodder balance. There is room, therefore, for considerable variation in both soil and climate before lucerne can be ruled out as a local factor in lamb raising.

Panicums, millets, and sudan grass are good fattening crops which can be sown in early spring. Sudan grass, particularly, is a good dry weather standby. Sorghum, if sown in January, should prove a most useful standover crop for winter and early spring. Oats, wheat, barley, canary, and rape also deserve a place in any green crop planting programme on a fat lamb farm. The breed of sheep available may be selected to suit particular conditions and circumstances.

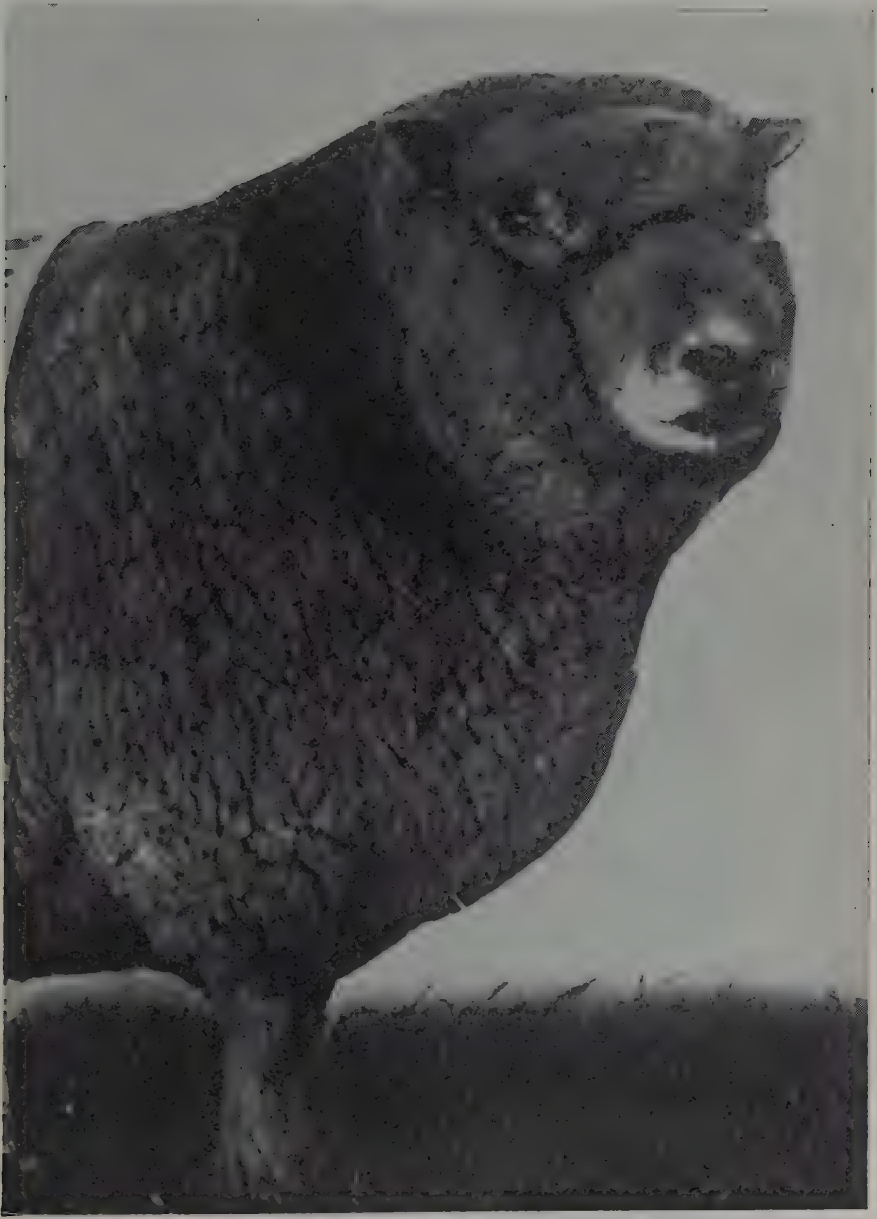


Plate 198.

A Southdown Head which indicates quality.

The Type of Lamb Required.

The present day demand is for a small, plump, well-shaped young lamb, and this demand exerts a big influence on the class of lamb to be bred. The marketable lamb should, therefore, be thickset, with a short body, broad and even in the back, with meat extending down the legs, which should be fine in the bone and fairly short. It should be full fleshed but not over fat, with both flesh and fat well distributed, and should dress at between 30 and 33 lb. When hung on the hooks the carcase should show a full U and not a V shape between the hind legs. To obtain the correct type there are three essentials—the suitability of the sire and the dam, and the food supply.

Some excellent lambs are produced in Queensland, but generally there is a lack of uniformity in combination with quality. As a consequence, there are too many classes, and lambs have to be graded into too many small groups, which reduce their general export value. Fortunately, all carcases are not required to be of exactly the same weight and grade, and lambs that are not models of perfection may be sold at satisfactory prices, provided they are young and in good condition. But as competition increases, as big a percentage as possible of the grade and quality in demand must obviously become the lamb raiser's main aim. The carcase most likely to meet with success in show and prize-winning competitions is that of the Downs types, and the nearer to the Southdown the nearer to present day demand. To make a special endeavour to obtain all lambs of this type would. however, eliminate some of the useful breeds and types of value in establishing fat lamb raising in Queensland on a sound basis. The Southdown and Downs breeds generally are mutton sheep, and do not produce the quantity or quality of wool to compare with the Corriedale or longwool-merino cross. They, too, tend to become over-fat for breeding, and do not give the milk yield necessary to promote a quick development in the lambs.

Breed and Types of Ewes.

As a fat lamb flock foundation the Corriedale can be given pride of place. The Corriedale is a hardy sheep, adaptable to the districts in Queensland, in addition to the Darling Downs, in which fat lamb raising is likely to become established—that is, in the higher regions distant from 50 to 150 miles from the coast, and in which the yearly rainfall averages from 35 to 25 inches. Next in preference are the longwool-merino crosses. The Lincoln, Leicester, Border Leicester, and Romney Marsh mated with the merino all give a crossbred well adapted to form the breeding flock. Of these, preference may be given to the Border Leicester in the plateau and warmer districts, and to the Romney Marsh in country closer to the coast, and on the lower lands and higher rainfall areas. Rams of these breeds, when mated with large-framed plain-bodied merino ewes, produce quick-maturing progeny likely to give a good return as prime lambs. The ewes of such unions possess the desirable characteristics so important in the foundation fat lamb flock. These longwool crossbred ewes also carry a good fleece, which makes up in bulk what it loses in quality; they are strong in constitution, and adapt themselves to diversified farming conditions, are good milk yielders, and give little trouble at lambing time. Their chief disadvantage is that they take after the long wools to too great an extent in their seasonal mating tendencies, and to obtain best lambing percentages autumn mating is necessary.

The pure merino is a very useful breed, but to get best results from them as mothers for fat lambs, young, large-framed, plain-bodied, western-bred ewes, culled for strength from a wool-producing flock, will give best results. An advantage in favour of the merino over the Corriedale or longwool crosses is that they mate successfully at practically any season of the year, providing suitable feed is available. They are obtainable in Queensland in large numbers, and if ewes cast for age are selected, they are usually available at a moderate or even a low price. The merino is a slow-maturing sheep, and as breeders under favourable conditions they will outlast most other breeds and crosses, but they are harder to fatten, and should, therefore, be fattened and sold before they become broken-mouthed. The flesh of the merino is darker than that of either British longwools or the Downs breeds, but a blend of their blood is desirable in bringing a richness of colour into the flesh of the dressed carcase. The merino is unlikely to become over-fat for breeding purposes, as is the case with other breeds and crosses. Their chief disadvantages, as compared with the Corriedale or British long-woolled crosses, are that they do not adapt themselves as well to diversified farming conditions, and they are rather restricted in their milk supply, while their lambing troubles are much greater. They are essentially a dry-climate sheep, as they thrive best where the air is light and dry with a low rainfall. Under most conditions their thin skin and heavy wool-carrying capacity is a disadvantage which is increased in the heavier air regions near the coast, and where the higher rainfall impairs their constitution and leaves them less able to resist parasitic attack, which is a common experience under moist, humid conditions.

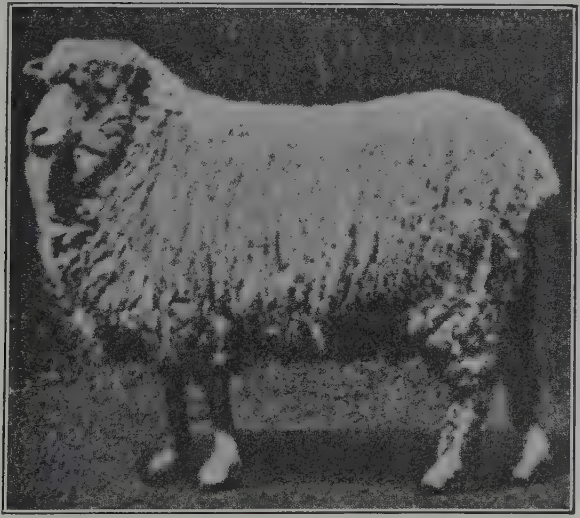


Plate 199.
The type of crossbred to form the breeding flock.

There are several pure British breeds and their crosses in Queensland, but not in numbers sufficiently large for lamb-breeding purposes. The Downs breeds, either pure or crossed, are not satisfactory because of their wool being light in weight and low in value, while their tendency to become too fat for breeding renders them unprofitable generally.

The Dorset horn is an exception, and if mated with the half-bred Lincoln-merino produces a type suitable for breeding with early mating tendencies. The Dorset horn and its crosses are very prolific, and an advantage may be expected from an infusion of this breed, especially in the hotter parts of the Western Darling Downs and further west and north. A comeback is derived from mating a merino to half-bred longwool ewes, of which the progeny are most suitable for early mating in the hotter pastoral regions, and it is a profitable wool producer.

Plate 200.

MERINO EWES.—Large-framed and plain-bodied, suitable for producing crossbred ewes.

The retention of the ewe portion of the drop to breeding age is not economic in some of the present lamb-raising districts because of the smallness of the holdings and high value of the land. The larger holdings further west, of less value agriculturally, which give a fair prospect of successful breeding and fattening, should run the longwools, especially the Border Leicester. The ewe portion of the progeny could be retained for disposal to farmers on the smaller "inside" holdings, as two-tooths. There is a considerable area of suitable country extending from the New South Wales border near Goondiwindi in a northerly direction and embracing Miles, Wandoan, Taroom, and even further north, which could be used to advantage for lamb-raising. This area, also, is suitable for the Corriedale, which as a distinct breed has special claims for consideration. It is a dual purpose sheep, and should be kept to the standard of large frames producing bulky long fleeces. Corriedales of suitable type possess all the good qualities of our best crosses, being big-framed, deep-bodied, and good wool producers. They also are good doers, and possess the hardy constitution necessary in the climatic conditions generally prevailing. The pure-bred lambs are not as quick in maturing to prime as other longwool cross lambs, but this can scarcely be expected from heavy wool producers. The Corriedale ewe also is a good milk producer, and when mated to sires of correct type it will rear quick-maturing lambs and give a profitable fleece of wool at the same time.

Choice of Sire.

Because of the influence of the sire over the progeny, full consideration of the location and conditions and the type of lamb in demand must be given to this matter. Whichever of the British breeds is chosen, it should be of a high grade and typical of that particular breed. As the services of the ram are likely to result in a drop of fifty lambs or over, it pays to spend a few guineas extra on getting pure blood of the correct type. Because of the wide range of soil and climatic conditions in Queensland, choice cannot be restricted to any one breed. There are two distinct types to be kept in mind—the large bulky type, such as the Border Leicester or Romney Marsh; and the low-set plump type, such as the Southdown, Dorset horn, or other Downs breeds. To obtain uniformity of type, a certain standard should be aimed at; such a standard is well defined in New Zealand where the Romney Marsh three-quarter bred ewes are extensively mated with the Southdown ram. In New Zealand, however, conditions—climatic and otherwise—do not vary greatly in one district or another and, consequently, uniformity is practically a constant factor in lamb raising.

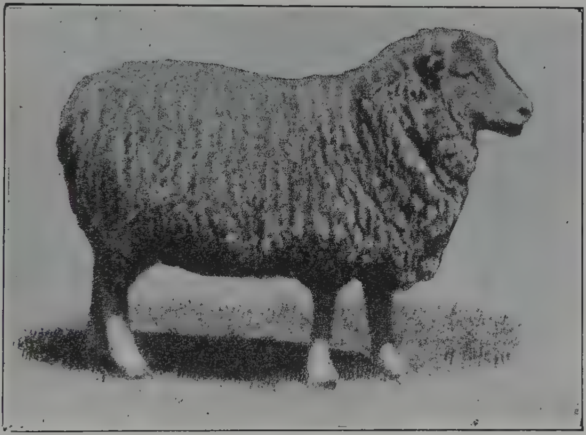


Plate 201.

Dorset Horn × Crossbred Ewe, a cross with early mating tendencies.

In Queensland, there are large areas now being claimed from the wilderness which, when improved, will give returns not yet realized. While the adaptability of these new districts to fat-lamb raising and crossbreeding is assured, to some extent, the breed of sheep best suited to the local conditions has still to be determined. The characteristics of the Corriedale for a pure breed, and Border Leicester for crossing with the merino, indicate a starting point for founding the ewe flock. The resultant ewe progeny mated with Dorset horn rams should produce a desirable fat lamb type. Uniformity in lambs is important, especially where the small flock numbers give little opportunity for selection.

The Ewe Flock.

Ewes should be in good store condition when mated, and the most satisfactory results may be expected from them when on a green bite sufficient to improve their condition.

Rams should be kept in an enclosure away from the ewes at all times except at mating time. All lambs should be as nearly as possible the same age, and success in this respect can be achieved only by timing the mating in keeping with the characteristics of the breed and seasonal conditions.

Plate 202.

A CORRIEDALE EWE.—A dual-purpose sheep suitable to form the breeding flock for fat lambs.

The merino and the Dorset horn are the only two breeds that, under normal conditions in this State, will mate at any season of the year. From a lamb-raising point of view, some success may be expected in this respect, but the British long-wool breeds and their crosses give best results when mated in late summer and autumn, say from late in January until June.

Yarding the breeding flock overnight is a sound practice, and it may vary from two to three nights a week. Only two-thirds of the rams should be turned out with the ewes for the first two weeks, and the remainder for the next four weeks. Six weeks or a little longer should be allowed, and if the health of the flock is safeguarded a good even lambing should be expected.

The pasture for the ewe flock at all times, other than when rearing the lambs and topping them off, should be just good enough to keep them going in strong condition. When short green grass is available it is the natural supply, and with regular drenching for worms, if necessary, they should keep in good condition. Should dry weather prevail for any extended period, a good lick, of which the basis is, say, one-third

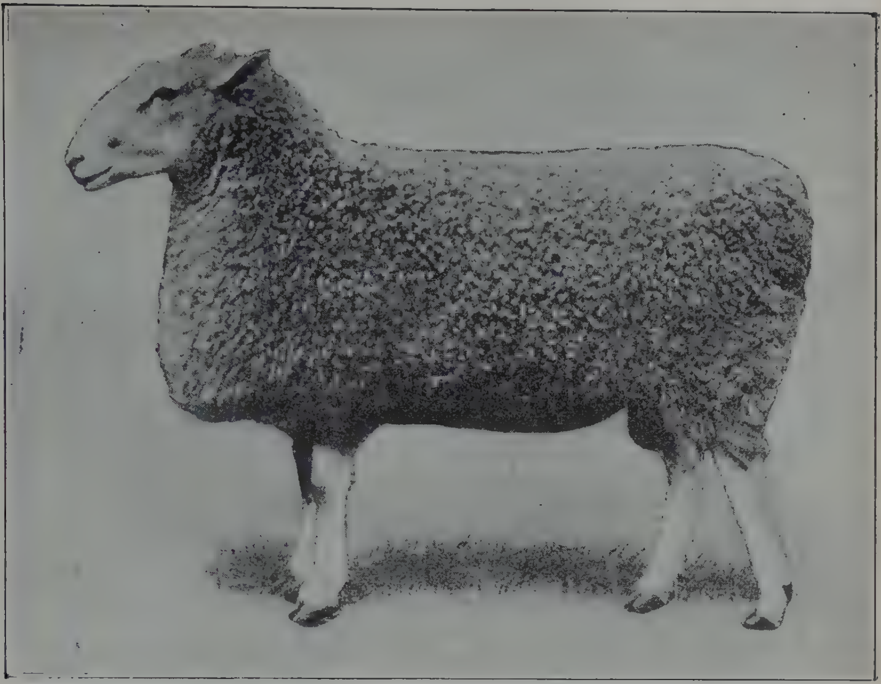


Plate 203.
A Border Leicester Ram.—Suitable for mating with the Merino to produce the breeders for fat lambs.

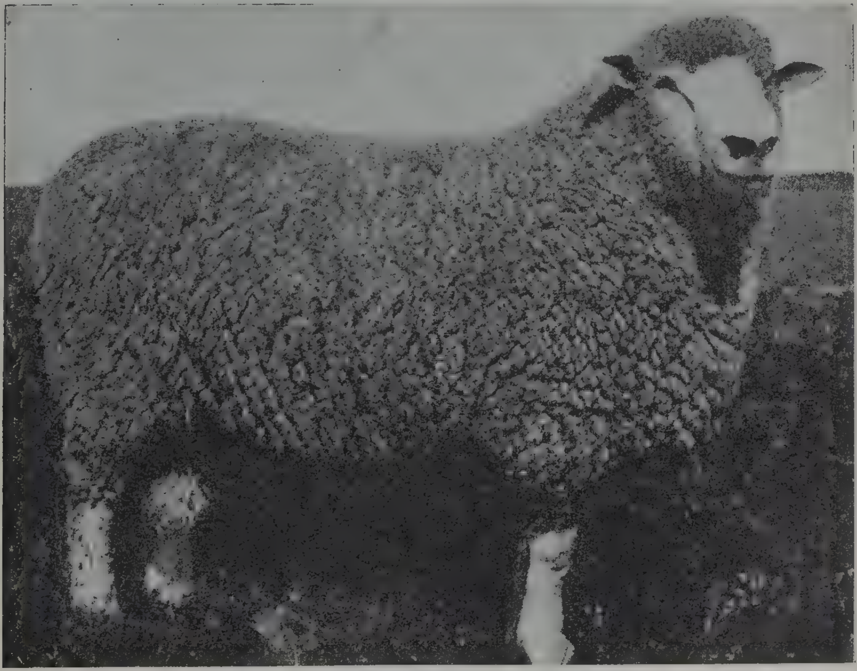


Plate 204.
A Romney Marsh Ram.—Suitable for mating with the Merino.

salt and two-thirds sterilized bone meal of good quality, should be provided. From the time they are "half gone," their well-being should be safeguarded, even to providing a supplementary ration. Good pasture land is the most satisfactory for maintaining the ewe flock, for it gives a more even supply of food and causes fewer irregularities. When near lambing time, the flock should be inspected at regular intervals, and in such a way as would be necessary at the actual lambing time in order that the ewes may become accustomed to such attention.

Plate 205.

A DORSET HORN RAM.—Suitable for mating with the Corriedale or Crossbred Ewes.

At lambing time, the number of ewes saved through proper care and attention goes a long way in bringing up the lambing percentages. Early morning visits are important, and the earlier the better. This is really the hardest and most exacting work of the season and calls for the greatest amount of knowledge and patience, besides exerting the greatest influence on financial results.

Seasonal conditions and good management up to the time of lambing have an important bearing on the lessening of lambing troubles, but the type of ewe and the breed of ram are also important factors in this respect. No matter what the conditions are, or what the influencing factors may be, however, proper care and attention are essential.

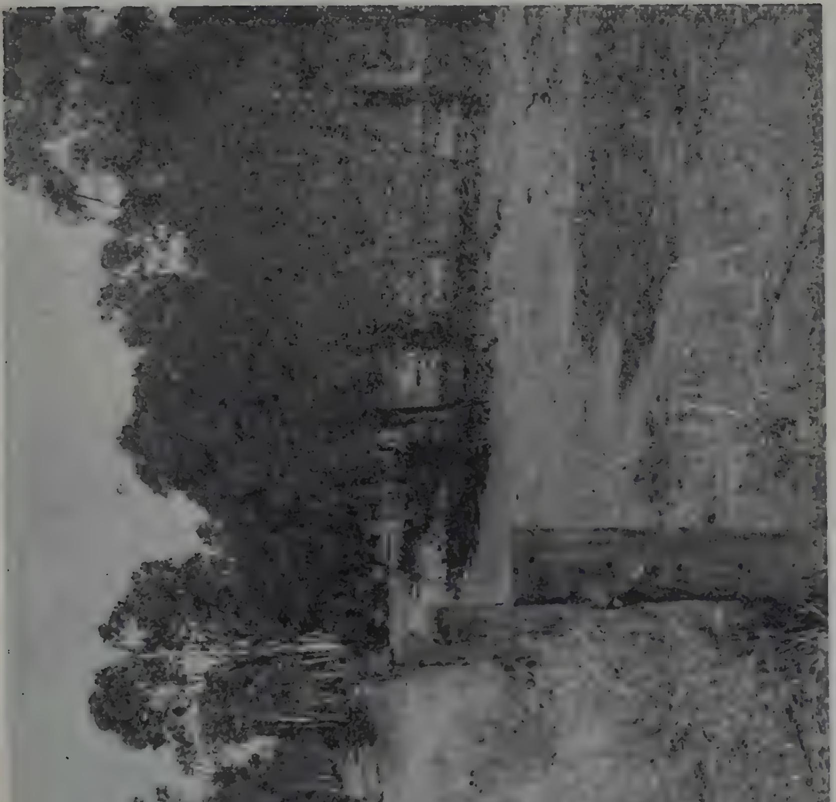


Plate 206.

A COMPARISON IN SHEEP COUNTRY.—Left: Country ringbarked two years previously and carrying one sheep to 2½ acres. Right: Country not ringbarked and carrying one sheep to 5 acres.

Care of Lambs.

In marking the lambs, a good practice is to have a secure temporary yard erected in the paddock in which the ewes and lambs are running. All instruments used in lamb marking should be sterilized in boiling water before use and kept in an antiseptic solution when not in use during operations. The younger the lambs are marked the better, as they do not then suffer much of a setback. When small numbers are to be treated, from two to four weeks can be accepted as the correct age. After marking, a combined antiseptic and healing solution should be applied with a clean swab or brush.

The utmost care is necessary in handling, trucking, and transporting lambs to market. If they are to be lifted, put one arm around the brisket, and get a firm grip of their skirt at the flank, with the one hand, in which way they can be handled without injury, and apply religiously the following "dont's"—

Don't overdrive the lambs.

Don't use dogs that bite.

Don't grab lambs roughly by the wool.

Don't prod lambs with sticks or ill-use them in any other way.

Don't overcrowd trucks.

Don't allow the lambs to fall off the gang-boards during loading operations.

Young lambs are likely to lose heavily in weight in transit. In tests carried out by the Department of Agriculture and Stock in 1935, the following losses were recorded:—

Romney Marsh-Corriedale cross—	
Live weight on holding	69 lb.
Live weight at saleyards forty-eight hours later	64 lb.
Loss	5 lb.
Southdown-Corriedale cross—	
Live weight on holding	71 lb.
Live weight at saleyards forty-eight hours later	66 lb.
Loss	5 lb.

This loss in weight is unavoidable, but it serves to emphasise the necessity of careful handling and early slaughter.

Under adverse conditions, the loss would, obviously, be very much greater.

THE FUTURE OF WOOL.

An opinion expressed recently—the opinion of an experienced wool man—was that, properly speaking, there is no wool problem. Quoting a German wool man, he said "the use of substitute fibres is meant only as a makeshift."

It is known only too well how often in recent years there have been wool trade disappointments of all kinds—prices, substitute competition, and so forth—yet, every year, all the clips are being lifted with an almost mechanical regularity. Generally speaking, wool still remains a stable commercial staple.

Transport of Stud Pigs.

E. J. SHELTON, H.D.A., Senior Instructor in Pig Raising.

THE transport by rail of pedigreed and other pigs for breeding purposes is arranged most conveniently by placing the animals in properly constructed crates and sending them by express goods or other trains giving rapid transport to their destination.

Sales of breeding stock are usually arranged on the basis of delivery in crate at sender's station and subject to return of crate to the same station, freight paid (if any), by purchaser and as early as convenient after delivery. Forward freight on such consignments in Queensland is subject to a rail rebate of 20 per cent. (on pedigreed as well as non-pedigreed animals) an amount which should be deducted from the freight total when it is being paid either by consignor or consignee. This rebate, however, is subject to the railway waybill being endorsed "For breeding purposes."

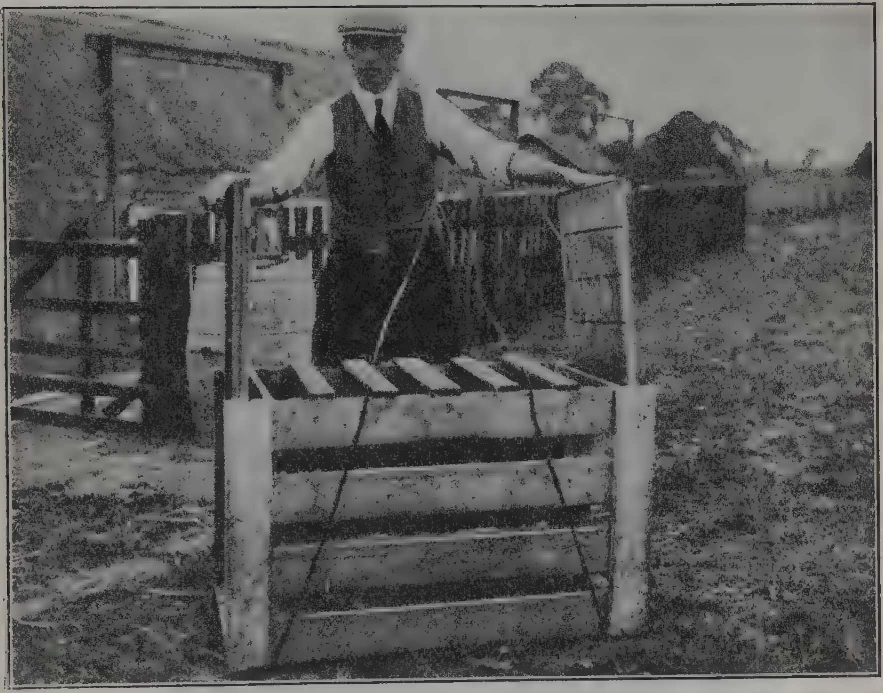


Plate 207.

A suitable type of crate for transport of stud pigs. Note that although this crate has been used principally for weighing pigs on the farm (see also Plate 208), it is of a type adapted for both purposes, the wires being attached when crate is used for weighing.

Note also that excellent opportunity offers on crates of this description for advertising name and address of stud, breed of pig, &c.

Care should be taken always to see that the crates are sufficiently large to allow the pigs reasonable freedom of movement, that a trough for food and water is provided, and that movable doors are fitted at each end of the crate.

It is usually preferable to use sieved sawdust as bedding in pig crates, instead of straw or grass. If pigs are consigned by rail for more than about 300 miles arrangements should be made for an agent to feed and water the animals en route; the expense incurred should be part of the original quotation or a condition of the transaction.

Wherever possible, the despatch of stud pigs in crates should be so arranged that the animals will not have to travel during very hot weather, especially over long distances. It should be specially noted, too, that consignments of stud pigs in crates will *not* be accepted by passenger or mail trains, or interstate or overseas steamers carrying passengers (tourists or otherwise).

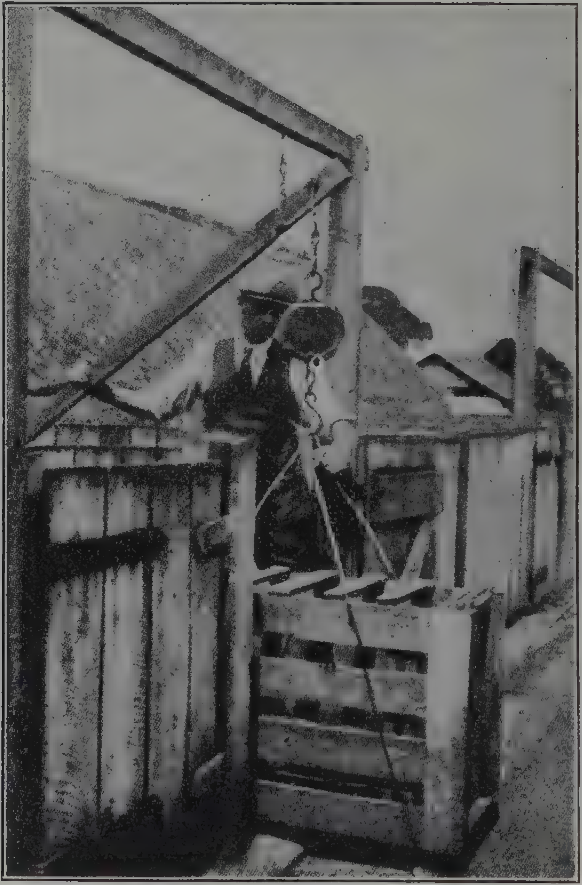


Plate 208.

Crate in position and ready for use in weighing pigs; front door is closed. Note, also, the arrangements of the top beam, lever, and spring balance.

In all such transactions three parties are principally concerned—the consignor (that is the sender or vendor), the consignee (the person receiving), and the Railway Department or other transport authorities.

So far as the Railway Department is concerned, provision is made covering the transport of the live animals at scheduled rates, but there are no special regulations relating to the carriage of returned empty pig crates, although they are given the same attention as other classes of goods.

The consignor is the one principally inconvenienced where there is delay in returning empty pig crates, for it is not usual for stud pig breeders to carry a stock of crates, only those actually required being available.

The Railway Department, of course, also becomes involved where there is delay in return of empty crates. In a recent report the Secretary to the Commissioner for Railways, Brisbane, had this to say, inter alia, in discussing the condition of crates as received and some of the hindrances to rapid return:—

> *Crates.*—No doubt these are made as light as possible to minimise freight, consequently after a period in use they become insecure and liable to damage by the pigs. The boards so often reported as missing are probably removed by the person receiving the pig to release the animal from crate and are not replaced on the crates when being returned.
>
> *Delay in Transit.*—Consignees (unfortunately) invariably use the original consignor's label as a return address, after alteration, and the labels falling off thus lead to the crate being separated from the book entry and resulting in its being held (by the railways) until placed through official correspondence.

As an illustration, the Secretary to the Commissioner indicated that the General Manager at Rockhampton had occasion recently to report to the General Manager at Brisbane that three pig crates addressed to a well-known stud piggery on the main line had been lying on the platform at an isolated siding for a considerable time. These crates had apparently been dumped on the platform without the farmer taking the trouble to consign them—that is, making out a consignment note and informing the station-master accordingly.

The farmer apparently was under the impression that empty pig crates are dealt with in the same way as empty cream cans, but this is not so, because crates must be consigned as goods, and unless so consigned they might be unduly delayed in their return.

Stud pig breeders and others concerned should note, therefore, that before empty pig crates are accepted by the railway authorities for return to the original sender's station they must be consigned in the ordinary way, and where freight is payable—as it is in the case of crates carried over long distances—freight must be prepaid by the person consigning, or finally by the person receiving the crate, if sender's station is not one at which there is an officer in attendance.

It is a good practice to advise the consignee by letter when empty crates are being returned, so that he shall not have to make unnecessary trips to the station in search of the crates.

The Railway Department, it must be admitted, cannot be held responsible if senders neglect to consign, or consign crates with boards missing or otherwise damaged, or without correct address labels firmly affixed to the crate.

It is wise to book space beforehand where crates are being forwarded either with the live pigs on the forward journey or when empty crates are being returned.

Particulars regarding the size of crates, materials used, and any other information on the subject may be obtained from the Department of Agriculture and Stock, Brisbane.

The Breeding Sow.

E. J. SHELTON, H.D.A., Senior Instructor in Pig Raising.

OF the many tasks which fall to the lot of the farmer engaged in the raising of pigs—pedigreed or otherwise—not the least important is that associated with the selection of breeding stock and their efficient feeding and control.

Just what type of stock to select, where to go in order to obtain reliable, healthy animals, the price to pay, how best to transport them, and—in the case of pedigreed stock—the keeping of breeding records, ductive strain. The capacity to breed freely, regularly, and abundantly, to the pig raiser. The business is simplified once the type is decided on, because the points to be observed are the same, whether selecting animals singly or in numbers.

In selecting the breeding sow, the essential points to be looked for are:—

Knowledge of ancestry and pedigree.

Development of, or indication of maternal instinct.

Indications of heavy milk production.

Body development, type, constitution, quality, and character.

Invariably it is the strain within the breed to which the greater importance is attached, for all breeds have good points, and there are reliable animals within every breed.

Modern market requirements demand the production of specified types, but whether the breed selected is the Berkshire, a medium-sized breed (often spoken of as a small breed), or The Large White (one of a group of large breeds), a similar type is required and, in general, bodily conformation should be along similar lines. These special market requirements have brought with them also the necessity for a reorientation of ideas. At one time it was thought to be good policy to cross the long, lean Tamworth boar with the short, fat Berkshire sow, but present day requirements make no provision for the short fat breed, whether it be Berkshire, Middle White, or any of the American breeds. Consequently, in bodily conformation, breeding sows require to be of similar type, even if they are of different breeds. Moreover, no matter how good the boar may be or how efficient the system of management, unless the breeding sow is capable of producing, suckling, and rearing satisfactory litters, the business of pig production will be less profitable. The breeding sow is the money maker and the cash return per sow per annum is the ledger item which will make all the difference between profit and loss. One has often heard farmers say of their breeding sows: "No, they are not for sale, money would not buy them"—thus indicating the paramount value they place on these animals.

One of the important points then is to ascertain whether the sow it is proposed to purchase comes from a prolific, easy-feeding, profit-making strain. As with the boar, it is not possible to determine these qualities from appearance alone. A reliable guide to inherited qualities is the performance records of the parent stock, and the would-be purchaser should demand of the seller the production of such records. A close inspection also should be made of the stock on the farm.

Many years were spent in educating dairy farmers to the great importance of production records in the dairy herd until to-day the dairy farmer looks naturally for the dam's production record as of prime importance when he goes to select a dairy bull or a heifer to provide fresh blood for his herd.

Some pig farmers have not yet developed this routine, but it is becoming more important each year and, in consequence, production records are improving and the business is becoming more profitable.

Pedigree and production records are of special importance and should on no account be overlooked, even if grade or crossbred sows only are to be bought. It is wise to remember, then, that, although individual excellence of the animal itself is highly desirable, it really occupies second place in comparison with the quality and production records of the parent stock.

Pedigree is the permanent record of the breeding of an animal, but is of little value in the absence of reliable records indicating the capacity of the strain to breed true to type and the ability of individual representatives to prove profitable by producing stock of equal or superior merit to those produced by the parents.

With non-pedigreed stock it is equally essential to study the records which indicate such important matters as prolificacy, prepotency, and early maturity. Selection on other lines might result in the purchaser obtaining a really good looking animal, yet a member of a small and extremely unprofitable litter and, perhaps, from a slow-growing unproductive strain. The capacity to breed freely, regularly, and abundantly which is called fecundity, is certainly inherited and is transmitted in no uncertain way. A breeding sow selected from a litter of three pigs cannot be relied on to produce large and satisfactory litters, even though individual animals from such litters may sometimes prove profitable.

Desirable Characteristics.

Constitution.—The innate bodily strength of an animal and the ability to withstand hardship, together with the capacity to resist disease is referred to as constitution and, as such, represents a very important point in brood sow selection.

The vigor and health of an animal is dependent on its constitution, although it is possible to ruin a good constitution by mismanagement and neglect. In the brood sow, a strong, vigorous constitution is indicated by a full, broad, deep, capacious chest (withal a light shoulder is highly desirable), roomy heart girth, good width between the eyes, ears, and forelegs, clean bright eyes, a moist snout, soft, silky, mellow skin and hair, and an attractive healthy action. Pigs need to be strong and healthy if they are to prove profitable.

Maternal Instinct.—To be distinctly feminine in type and of a gentle, matronly disposition is important in a sow. Large-bodied sows are better than small-bodied animals. The long-bodied, light-shouldered type is to be preferred to the short, dumpy class; coarse masculine types which run to fat and lack maternal instinct are quite useless.

By maternal instinct is meant the capacity of the sow to desire to become the mother of numerous progeny and, having produced such a litter, to be able to care for and suckle every piglet in a true maternal way. Big, burly, "beefy" sows which look as though they would turn

Plate 209.

Contentment and docility are innate characteristics which are worth developing in the brood sow. Such matronly virtues plus prolificacy have given the modern breeding sow a reputation not excelled by any other animal.

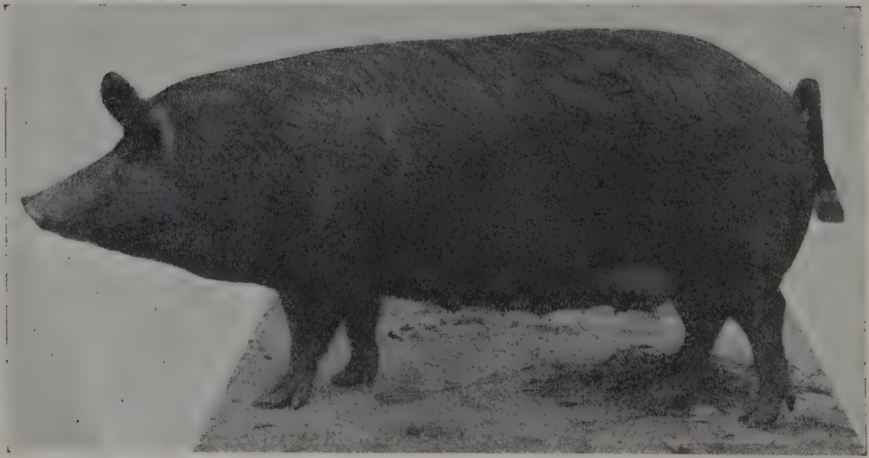


Plate 210.

Brood sows should be distinctly feminine in character and habits, any tendency to coarseness and masculinity being strictly avoided. This sow is of a type within her breed classed as very desirable.

up their noses at the job of suckling litters are often seen in a piggery, some are of a cranky, fighting disposition, preferring all the room at the food trough or in the sleeping quarters. This type of sow is a bugbear to the industry, as also are those small, pot-bellied types so frequently observed with litters of three and four, the usual result of the belief of some farmers that the sow is old enough to breed just as soon as she is big enough to take service.

Size, Conformation, and Control.—Bodily conformation is certainly hereditary; that is why certain families or types become so popular. Breeding sows should be large, roomy, yet well-proportioned, with wide deep chest, long deep body, and well developed hindquarters; otherwise, they are unable to allow for the development of large thrifty litters and for their free and easy birth at farrowing time.

This capacity to produce and rear numerous progeny must be encouraged by proper development during the early stages of the animal's life, and by its selection from strains noted for these desirable and necessary qualities. This requires that during the growing stages the animal should be encouraged to grow and stretch out in preference to becoming fat; and this can best be done by permitting free range over succulent pastures where the animal will have opportunity of picking up not only green food and mineral elements, but will have the benefit of sunshine, exercise, and a clean, healthy living environment. Animals appreciate such conditions, and grow and develop to considerably more advantage than is possible under conditions unfavourable to such rapid growth.

Indications of Milk Production.—The capacity of the sow to produce large quantities of rich nourishing milk is inherited just as it is in the case of dairy cows. Many breeders overlook this most important point and select their stock without any thought of it. It is a fact that some strains of pigs and some animals within other strains are very poor milkers and lack maternal instinct; they do not produce sufficient milk to satisfactorily nourish their litters. Other strains are noted for ability to milk heavily and for a period of two months or more per litter.

According to authorities on feeding, the average daily milk yield for Berkshire, Poland China, and some other brood sows whose breeding was not recorded, ranged from 4·9 to 6·3 lb. daily. The average total yield for 84 days, by which time they went dry, was 429 to 532 lb.

Some sows gave twice as much milk as others. Difficulty was experienced in securing the sow's milk for purposes of testing or recording, hence this figure must be accepted as a guide only to the productive powers of good quality breeding sows.

In special tests it was shown that sow's milk is richer than cow's milk in all nutrients and especially in fat, for it contains on the average 6·7 per cent. fat. One investigator found that fat globules of sows' milk only one fourth as large as those of cows' milk, but eight times as numerous.

The commercial value of a litter of pigs at weaning time will be very largely influenced by quantity and quality of the milk produced by the sow, hence the number of teats and development of the sow's udders is of much importance. The number of teats varies from ten or fewer to fourteen or even sixteen. Since each pigling requires its own teat (and will fight regularly for same) it is essential that the sow have from twelve to fourteen teats in order to be able to suckle a corresponding number of pigs. The number of teats the breeding sow should have should not be less than twelve. It is undesirable to retain ten-teated sows (or sows with fewer teats) and generally more than fourteen teats is unnecessary although very long-bodied sows capable of rearing very large litters may have sixteen well-developed teats. The teats should be prominent, evenly spaced, and be set well towards the front of the belly. It is suggested that the teats nearest to the breast are those which produce the largest flow of milk.

Prolificacy.

Prolificacy should be the constant aim in selection and development of breeding stock. If the average litter can be maintained at eight to ten (or twelve) reared there will be a greater measure of success than is the case if the number reared is fewer than eight.

That prolificacy is possible and that pigs are productive creatures is amply evidenced by the following summary of litters notified to the National Pig Breeders' Association of England for the year ended 31st December, 1937, and published in the 1938 volume of the National Pig Breeders' Association Herd Books.

Breed.	No. of Litters Notified 1937.	Average Pigs Born per Litter 1937.	Average Pigs Reared per Litter 1937.	Average Pigs Reared per Litter.		
				1936.	1935.	1934.
Berkshire	220	7·85	6·37	6·19	6·95	6·76
Large White ..	13,324	10·62	8·07	8·06	8·10	8·17
Middle White ..	679	9·45	7·46	7·6	7·58	7·65
Tamworth	94	8·37	6·61	6·45	6·53	7·17
Wessex Saddleback ..	1,713	9·91	8·25	8·33	8·32	8·37

Remarks.—In studying these figures it is well to remember that the very large number of litters recorded in favour of the Large White might favourably influence the figures in that breed, as against, say, the Tamworth, with fewer litters notified.

The figures, however, can be accepted as a reasonably reliable guide of production and rearing averages for sows in these breeds of pigs.

Record Litters.—Record-sized litters are often reported, and emphasise again the prolific nature of the breeding sow. Although extremes are undesirable some sows have been able to establish records which it would appear would be difficult to excel. There are numerous records of litters varying in numbers from fourteen to twenty, but very rarely is it possible for the sow to suckle and rear so many.

The Œstral Period.—Sexual heat or œstrum occurs at all seasons of the year, and is not a seasonal condition as in the case with animals who bear fewer progeny and come in more seasonally. Œstrum usually develops within ten days of farrowing, and recurs every twenty-one days, persisting on each occasion for a period of three days or until conception takes place.

The normal breeding life of the sow is five to six years, or more; exceptionally good sows have been known to continue breeding up to the age of twelve years, but in general the sow becomes less profitable each year after reaching six years of age. Thus, commencing at nine

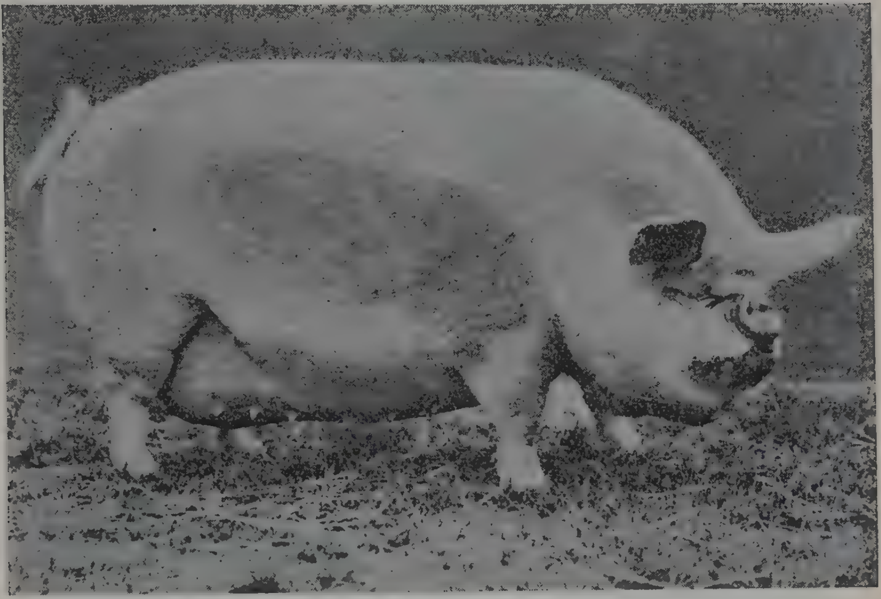


Plate 211.

To be able to suckle her babies and bring them to weaning age in satisfactory condition, the brood sow must have capacious udders and from twelve to fourteen well-developed teats, well forward and evenly placed along the underline. Sows with fewer teats or with blind or dummy teats should be avoided.

Plate 212.

Carrying more condition than is usual, this sow has given birth to, and is rearing, a nicely developed litter. Care should be taken to avoid having brood sows too fat and they must be allowed regular exercise daily on clean succulent pasture, otherwise trouble may be expected at farrowing time.

to twelve months of age, and breeding regularly twice per annum, the sow should produce up to twelve or fourteen litters during her profitable life, after which it is advisable to prepare her for the butcher, when her carcase invariably forms the base of that great variety of small goods for which the carcase of the pig is famous.

Weaning.—Weaning invariably takes place at about eight weeks of age. In cases where the sow can comfortably suckle her progeny more than eight weeks it will be found to be an advantage to allow sow and suckers to run together for a longer period, up to nine or ten weeks, even if in the meantime the sow comes in season and is mated.

Plate 213.

Spoken of in England as gilts, or yelts, and in Australia as young sows, this young animal carries light shoulders and well-developed hindquarters such as are desirable, withal she has a lengthy, well-developed body, fine bone, and a nicely developed coat.

The Skin and Hair as an Indication of Health.—The skin and hair are always a good index to the health and thriftiness of an animal. The skin should be moderately moist, reasonably free of scurf, and mellow or soft (in comparison) to the touch.

The hair should be bright, soft, and glossy, and should have a slightly oily tendency. If the skin is dry and harsh, with a heavy coating of scurf, and the hair is dry, partly brittle, and inclined to stand on end, it is reasonably sure that the animal is not in good health.

The healthy animal has an active, sprightly gait; it carries itself well on its legs, and has bright, kindly eyes, plus a generally healthy and contented disposition and a well-curled tail.

If the animal is stiff, sore, and slow in its movements, with the head and ears drooping and tail hanging limp, and if there is a rising temperature and a very unpleasant smell, it can be considered the animal is sickening or is seriously ill, and needs immediate attention.

Period of Gestation.—The average period of gestation in the breeding sow is stated by various authors as four months or three months three weeks three days, 112 or 114 days, or 116 to 120 days, or sixteen weeks. The shortest known period is 110 days, and the longest known period 130 days. No details are available as to the individual records in these cases. The terms gestation and pregnancy are synonymous, and are the names given to the condition of the female when developing young are present in the uterus. The period of pregnancy or the gestation period is the duration of time which must elapse between successful service, usually referred to as conception, and the period of birth, referred to as parturition. The period of gestation, as indicated above, varies in different individuals, and in the case of the sow may vary from fifteen to seventeen weeks, with an average of approximately sixteen weeks. (See Gestation Chart, page 84, January, 1939, issue, Q.A.J.)

Plate 214.

Bedtime on a pig farm where better pigs on every farm is the objective.

It is apparent from Australian experience that sows having the benefit of succulent and nutritious pasture, plus liberal daily exercise in the sunshine in clean pig paddocks where they are undisturbed by other stock are more likely to farrow satisfactory litters than sows who are continuously housed or held under conditions other than those referred to. But keeping pigs in pig paddocks is satisfactory only where clean, warm, dry shelter sheds are available in which the pigs may camp at night. As the farrowing stage approaches it also is advisable that each sow be drafted to her own individual yard or pen, and this should be done approximately three weeks before the birth of the pigs.

Sows do not always agree when housed together at farrowing time, and any disturbance at feeding or at any other time is likely to result in abnormality at birth of the pigs, if not in abortion or other calamity.

Under open-air conditions and with succulent grazing there should be little or no necessity for purgative medicines before or after farrowing, but as individual animals differ in habits, and some are lethargic at this stage, a warm bran mash in which is incorporated 3 fluid oz. of castor oil and just sufficient table salt to disguise the flavour of the oil will prove beneficial if given two or three days before birth date. The use of drastic purgatives should be strictly avoided, as the after effects are liable to bring on irregularities in the digestive organs. In these, as in many other matters associated with the management of pigs, it will be found that careful control is a very great advantage, and will do more than medicine or force in the securing of satisfactory results. The food should be of a laxative, nourishing nature, and quantity should be strictly regulated according to the condition of the sow and litter.

It is unwise to rout in-pig sows by dogs or to force them to jump logs or troughs or to crowd together and rush through narrow openings or under low-set rails. Exposure to extremes of the weather, undue excitement caused by the presence of other sows or the attentions of an over-active boar, the use of rough, coarse, fibrous foods, lack of minerals and succulent green food, lack of drinking water—these all have disastrous effects on the progress, both of sow and of her litter.

The breeding sow should be normally and regularly exercised. She should be of a docile, contented temperament, any tendency to flightiness being disastrous, for a vicious sow is not only a danger to her own pigs, she is a dangerous animal so far as children and adults are concerned. Similarly, any tendency to sluggishness or over-fatness should be guarded against. Where animals are active and well cared for they take regular exercise willingly; they look and anxiously wait for it. They will also maintain themselves in better breeding condition, and will not have the tendency to become lethargic and sickly, or to become costive—in fact, constipation is the sow's greatest enemy at the stage when she is due to farrow, and unless promptly corrected is liable to lead to fevers (usually referred to as milk fever) and cessation of milk supply.

LAND FOR PASTORAL LEASE.

A resumption from Uanda Holding, known locally as Corinda, will be opened as a preferential pastoral holding at the land office at Hughenden, on Thursday, 1st June, 1939. The block is situated 80 miles north of Aramac and 98 miles south-east from Hughenden. It has an area of 121 square miles and the term of lease will be for thirty years at an annual rental of £3 6s. 8d. per square mile for the first ten years.

A condition will be that the block must be fenced with a marsupial-proof fence during the first three years.

The block is watered by waterholes, a small flowing bore, and three subartesian bores, and the country is described as open to moderately-timbered country, with patches of open brigalow and small plains with belts of gidya and boree scrub, being generally well grassed with good sheep grasses.

Free lithographs and full particulars may be obtained from the Lands Department, Brisbane, and the Land Agent at Hughenden and the Queensland Government Tourist Bureaux at Sydney and Melbourne.

The Cashew Nut.

S. E. STEPHENS, Instructor in Fruit Culture.

ALTHOUGH very well known and popular in the market places of its native home, the Cashew is unheard of in the markets of Queensland; in fact, it is quite unknown to all but a very few people. Even trees of this peculiar fruit are very few in the Queensland tropics.

A native of tropical South America, it is related to the mango, and is known botanically as *Anacardium occidentalis.*

The habit of growth is frequently ungainly, trunk and branches being very crooked and twisted. The foliage is clustered towards the ends of the stiff branchlets, the leaf being broad, oblong-oval, with rounded or emarginate apex. The flowers are produced in terminal panicles.

The fruit is peculiar in that it appears to carry its seed externally as an appendage at the lower end. In reality, the upper fleshy portion is the swollen peduncle and disc. The fruit proper is the seed or nut suspended from this.

The fleshy portion, called the Cashew apple to distinguish it from the true fruit or "Cashew nut," is commonly used for food purposes in its native Brazil. With its distinctive aroma it is said to make a pleasing jam, and is also used largely for making wine and a species of beverage similar to lemonade. The edible varieties of the Cashew apple are bright yellow or brilliant red in colour when ripe, thin skinned, juicy, and astringent.

The Cashew nut is a regular article of commerce, and is imported into European countries in fairly large quantities. It is a kidney-shaped nut about an inch in length and protected by a tough husk or shell, possessing caustic properties due to the presence of cardol and anacardic acid. Fortunately these substances are easily dispelled by heat. The nuts are, therefore, subjected to roasting, which renders them perfectly innocuous. The resultant product is a fine edible nut.

The Cashew is a simple tree to grow, but is one that dislikes being transplanted. The usual mode of establishing trees is to plant the fresh seed in the situation the tree is to occupy. The seed germinates readily within a few days, and the young trees make rapid growth both above and below ground. In young trees the tap root is often more extensive than the aerial growth, but lateral feeding roots are often deficient.

Growth is rapid for several years, and under favourable conditions the tree will start bearing at about three years, the crop being ripened during the summer months.

The tree is usually regarded as being fairly short-lived, surviving for only fifteen to twenty years, when it gums excessively and dies out. In North Queensland, however, several trees up to about twenty-five years old are still vigorous, and fruit well when seasonal conditions are favourable.

In regard to soil requirements, the Cashew is not particular, but its preference is for a sandy soil. It is intolerant of frost and does best under fairly dry climatic conditions, consequently its cultivation must be restricted to the drier parts of the tropics.

Well known allied species native to Queensland are the Burdekin plum (*Pleiogynium solandri*) and the Tar tree (*Semecarpus australiensis*). The former of these produces an edible fruit with a large stone, and is popular with school children. The latter exudes a black tar-like substance from both the bark and the fruit, which may cause a great deal of pain if it comes in contact with the skin.

WINDBREAKS AND SHELTER TREES ON THE FARM.

For the comfort of stock in cold weather windbreaks are a necessity on open plain or high tableland country. In timbered country, provision should be made for windbreaks when the land is being cleared, by leaving suitable stands of the original forest covering. Otherwise, the expense of establishing shelter belts will have to be incurred later on. Meanwhile, stock will have to suffer all the discomfort caused by winter's frigid westerlies, which blow usually for days on end.

In country which has already been cleared the planting of suitable trees on the prevailing windward boundaries of farms on tablelands, plains, and undulating country is, therefore, worth serious consideration. If edible trees are planted they might be used in times of drought. A farmer would naturally hesitate before destroying shelter trees for feeding purposes, but, if the necessity arises, edible trees may be lopped without destroying them.

The undermentioned trees are mainly suitable for planting on the Darling Downs. Edible types are the kurrajong, bottle tree, Portuguese elm, honey locust, and carob bean. Less palatable trees are the cypress (*Cupressus torulosa*), *Pinus radiata*—commonly known as *Pinus insignis*—white cedar, and *Bauhinia hookeri*. The well-known and admirable western tree, the wilga, should be added to this list if it is available in the local forests. Although there is a considerable amount of variation in the palatability of individual trees, the wilga is both a useful and extremely ornamental species.

In most cases the trees mentioned can be purchased from nurserymen. In the event of expense proving an obstacle to adequate planting, the trees can be raised from seed in an improvised nursery on the farm. The seeds could be germinated in shallow boxes or tins about twelve months before the young trees are required for planting. In frost-free areas June, July, and August are suitable months for planting out the young trees in their permanent locations. Some protection must, however, be given to the plants in frost-susceptible districts if midwinter planting is attempted.

Protecting the young trees from stock is most important. If the trees are planted near a boundary fence, it might be found most convenient to erect a second inner fence to keep stock away from the trees until they are high enough to be out of reach. Smaller farm stock, such as sheep, can be let into the enclosure once the trees have attained sufficient height for their foliage to be above the reach of the animals.

—*W. D. Francis.*

Plate 215.
Overseas boats loading wool at Hamilton Reach, Brisbane River.

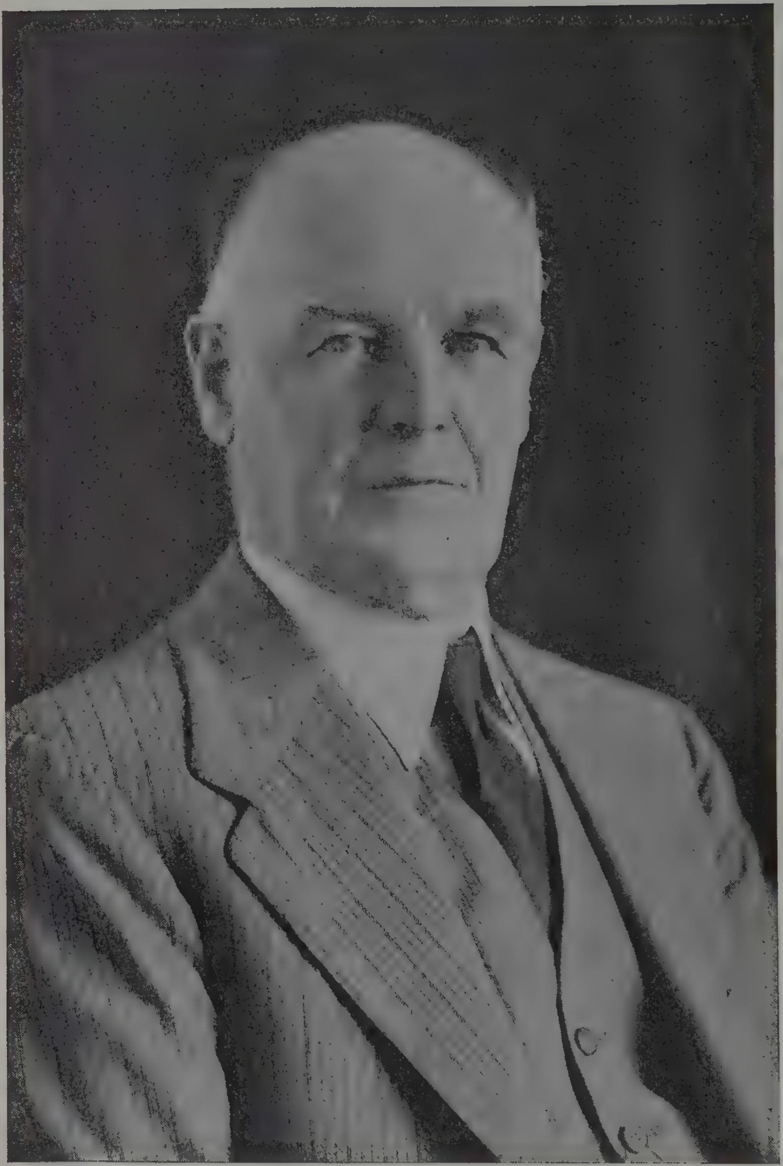


Plate 216.
THE LATE ROBERT WILSON.

In Memoriam.

ROBERT WILSON.

Mr. Robert Wilson, Acting Under Secretary and Director of Marketing of the Department of Agriculture and Stock, died on Wednesday, 19th April, at his home, Kirkland Avenue, Coorparoo. He was actually the executive head of the Department, but as he had almost attained the retiring age when his predecessor, Mr. Ernest Graham, died last year the permanent appointment was not made.

The late Mr. Wilson, who was 65 years of age, was born in the Logan River district, where his father was engaged in cotton and cane planting, and sugar manufacture.

Mr. Robert Wilson was an old Brisbane Grammar School boy. Upon leaving that school and passing the Public Service examination, he was appointed to a junior position in the then infant Department of Agriculture and Stock. By sheer ability he rose step by step in that department, in practically every branch of which he served until he became its principal executive officer. In addition, he held at various times the secretaryships of important conferences, such as those dealing with rust in wheat, and of the Board of Advice under the Diseases in Plants Act, the Meat and Dairy Board, and the Royal Commission on Central Sugar-mills, also of the various annual agricultural conferences held in different parts of the State from 1897 to 1903.

When the State Hansard staff was short-handed, Mr. Wilson, who was an expert shorthand writer, capably filled the vacancy until a permanent appointment could be made.

In January, 1935, Mr. Wilson was appointed Assistant Under Secretary, assuming the administrative responsibility under ministerial direction and by delegation from the Under-Secretary of a great department with activities and influence covering rural industry throughout Queensland. He was a member of the Agricultural Bank Board, Deputy Chairman of the Rural Assistance (Farmers' Rehabilitation Scheme) Board, and a member of the Dairy Products Stabilisation Board. He also was Government representative on the Butter and Cheese Boards, and other commodity boards operating under the Primary Producers' Organisation and Marketing Acts, and related legislation. He frequently accompanied Ministers for Agriculture to the meetings of the Australian Agricultural

Council in the South. For many years he was a member of the Royal National Agricultural and Industrial Association.

The late Mr. Wilson, who was a brother of a brilliant cavalry leader, Brigadier-General L. C. Wilson, served in the Great War with the 47th Battery, 12th Australian Field Artillery Brigade, on the Somme during the 1916-17 winter, through the autumn operations in the Ypres area in 1917, and the subsequent winter campaign, also during the memorable events on the Somme and the Lys in the last year of the war. He was a vice-president of the State Service Branch of the Returned Sailors and Soldiers' Imperial League of Australia.

Mr. Wilson was a prominent amateur cyclist and rower, and also an administrator of those sports. He was at various times treasurer of the Queensland Cyclists' Union; captain, secretary, and treasurer of the Brisbane Safety Bicycle Club; secretary, captain, and treasurer of the Commercial Rowing Club; a member of the Rowing Council; and selector of the Queensland Rowing Association.

In 1903 and 1904 he was champion of the Brisbane Safety Bicycle Club. He won several Brisbane Grammar School old boys' cycle races, and in 1900 was second in the Australian five miles championship.

He also was a member of the champion eight crew of the Commercial Rowing Club of 1909. He was a ground member of the Queensland Cricket Association, and a supporter of Rugby football.

Wherever he was—in the Department, in the A.I.F., in sports (in which for some years he figured so prominently), and amongst his friends—the late Mr. Wilson was noted for his straight-forwardness and his unvarying courtesy.

In official life he lived up to the highest ideals of public service. He was a friend of the junior officers, in whom he took an especial interest, guiding and influencing them in their choice of career in branches of the Department for which they had a natural aptitude. His was an attractive personality, to which occasional flashes of whimsical humour were an additional charm. Those who had the privilege of close association with him, officially and otherwise, revered him for the strength and simplicity of his character, his unfailing fairness, and other qualities of mind and heart which inspired both respect and affection for him.

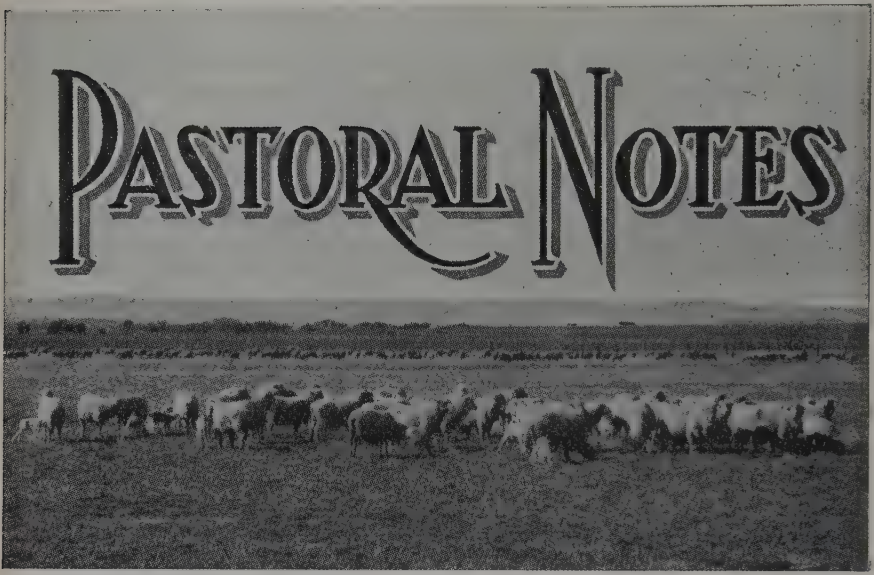
Many hundreds of people in all walks of life attended the funeral on the afternoon of 20th April, and a stream of motor vehicles almost a mile in length was a testimony of public appreciation of Mr. Wilson's long period of service to his native State and his qualities of citizenship. Among the wealth of floral tributes was a wreath from fellow Diggers and inscribed "Mourning the loss of a staunch and well-beloved comrade." The pall-bearers were Brigadier-General Wilson, Messrs. W. Preston, E. McCaskie, J. Smith, C. J. McKeon, and H. J. Freeman.

Among an overflowing congregation in the chapel of the Mount Thompson Crematorium were Hon. D. A. Gledson (representing the State Government), Mr. E. B. Maher (Leader of the Opposition) and many other members of Parliament, Mr. R. P. M. Short (Acting Under-Secretary), and officers of every branch of the Department of Agriculture and Stock, representatives of every other department of the Public Service, of the University of Queensland, of the Council for Scientific and Industrial Research, the Council of Agriculture and associated commodity boards, Ex-students' Association of the Queensland Agricultural High School and College, of the State Service Sub-branch of the R.S.S.I.L.A., and of the professional and commercial life of the city, and of numerous sporting bodies. To Mrs. Wilson and her young family and to other bereaved relatives our very deep sympathy is extended.

The Minister's Tribute.

"Mr. Bob Wilson, as he was known to all his associates, was a white man," said the Acting Minister for Agriculture and Stock, Hon. D. A. Gledson. "No officer of any department was more beloved than he by those with whom he worked, and no one had a closer grip of all branches of the Agriculture and Stock Department. He was personally known to and knew personally every officer. His association with the Minister with whom he served was always the closest. He was not only an officer, he was a kindly friend, and while I only had the opportunity of seeing him as Assistant Minister during his illness, his thoroughness and capable handling of all problems in the department were of the greatest assistance to me in taking over the responsible position which I now hold.

"We all feel that we have lost a dear friend who will be hard to replace, and desire to extend our heartfelt sympathy to Mrs. Wilson and her children in their great loss."



Summary of Position in Regard to the Tick-fevers of Cattle.

DR. JOHN LEGG, Animal Health Station.

MOST stockowners are aware that views regarding tick-fever of cattle have been radically altered during the last few years; for whereas it was originally considered that only one type of tick-fever (piroplasm) was prevalent in Queensland, it is now known that there are three serious types and one practically harmless type—making four altogether. All these findings have been the result of investigations carried out during the last few years.

Of the three serious types, two produce "redwater" in cattle, the third does not. The terms "redwater" and tick-fever are therefore not synonymous. One "redwater" type (piroplasm) has been known to exist here ever since ticks invaded the State; the second "redwater" type (babesiella) was only discovered three years ago. The third, or non-"redwater" type (anaplasm), was discovered five years ago.

Further extensive observations have been carried out, particularly during the last twelve months, and these have brought to light some important facts. Briefly, some of these facts are as follows:—The first type of redwater tick-fever, which was once thought to be the sole and only cause of our tick-fever troubles in Queensland, is found to be relatively rare in outbreaks of tick-fever; the second type of redwater tick-fever is extremely common, and causes more than 90 per cent. of our losses; while the third, or non-redwater type, is like the first—rare. It may be remarked in passing that this third type, although only associated rarely with outbreaks in Australia, is usually very bad in other countries where it occurs, i.e., North and South America, Africa, and the East generally.

The campaign of inoculation has, therefore, to be directed mainly against the second type of redwater tick-fever, the other two types being comparatively less important.

It was originally found that if cattle were inoculated against the first type of redwater tick-fever (piroplasm), they were usually resistant to the second type of redwater tick-fever (babesiella) when inoculated with the latter by means of the hypodermic syringe. The resistance also held fairly well when this inoculation was performed by the tick, but the variation among different cattle was such that quite often the resistance broke down.

The original vaccine, therefore, which contained two types of tick-fever, i.e., the first redwater type of tick-fever (piroplasm) and the third non-redwater type of tick-fever (anaplasm), has been reinforced by adding to it the second redwater type (babesiella).

This means that a more severe type of reaction may follow inoculation, which is a disadvantage, but it is compensated for by the advantage that the animal is more resistant after reacting.

Many important facts have been elucidated regarding vaccination. It has been found that with reservoirs (bleeders) used for bleeding purposes for vaccine preparation the ''concentration'' of the parasites in their blood varies considerably, so that at times they may not produce ''reactions'' in susceptible cattle. On the other hand, susceptible cattle may completely fail to react, although the vaccine may be perfectly good, i.e., in these cattle the inoculation does not ''take.'' The reason why is not known, but it is important that it be recognised. It also has been found that infection with any of these types may completely die out, even if the animal remain on tick country. Such an animal again becomes susceptible.

Another very important observation made is that there are numbers of cattle within the tick-infested areas which are continually bitten by ticks and, although susceptible to the various types of tick-fever, they do not become infected, perhaps, over long periods of time. This, of course, occurs mainly in the lightly tick-infested country.

It also has been observed that groups of cattle are very susceptible to inoculation with these various types of tick-fever parasites.

All these facts make the preparation of a ''standard'' vaccine which will always produce a ''good'' reaction in susceptible cattle with no or only a very low mortality and, at the same time, leave the animal resistant to all types of tick-fever a very difficult problem. In fact, from some points of view the problem is almost beyond solution, i.e., no one can measure the susceptibility of an animal before inoculation.

Fortunately, the use of acaprin, a drug prepared in Germany, has been found to be very effective against both types of redwater tick-fever. This drug is now used extensively. Owners inoculating should always have it on hand. They should use it without hesitation when the animal is seen to be sick. In many cases its effect has been almost miraculous. In bad cases it may be injected into the vein direct. Under the skin it does not cause the infection to die out, but if injected into the vein it may completely destroy the infection. But in a valuable animal the main point, for the time being, is to save its life. The animal can easily be vaccinated again.

The drug can be used equally well in both natural cases and severe reactions following inoculation, and no owner should attempt the inoculation of cattle without being in the position of obtaining the drug at once, should he require it.

The inoculation for tick fevers and the control of these diseases is being made as effective as possible, but the condition under which cattle are maintained in Queensland, i.e., large mobs and big areas, makes adequate supervision very difficult. Much depends on the assistance of the owners.

MOLASSES AS A STOCK FOOD.

The use of molasses as a stock food received considerable attention during the last dry spell in South-eastern Queensland, when it was probably the most valuable and inexpensive carbohydrate concentrate available. Doubtless this by-product of the sugar industry could be employed much more extensively than at present, for it is valuable not only as an appetiser and conditioner, but as a source of carbohydrate—a most essential energy food.

The sugar industry is able to supply large quantities of molasses annually, the only drawback being the cost of freight involved in transporting it over long distances. There would be no difficulty in stock-owners acquiring large consignments of molasses at £1 per ton at sugar mills, but some provision for containers would be necessary.

Experiments have been conducted at the Mackay Sugar Experiment Station to determine the true value of molasses as a concentrated feed for farm horses. All animals at that station receive the following daily ration while in work:—Chaffed cane tops (chop chop) or panicum grass, 54 lb.; molasses (heavy), 6 lb.; linseed meal, 3 lb.

The chaffed cane tops supply portion of the nutrients as well as the bulk; the molasses provides the extra sugars, an energy material; while linseed meal is an excellent source of protein.

The farm horses have done particularly well on this ration, and at the conclusion of the harvesting season were in remarkably good condition.

Farmers might well compare the costs of this ration with one involving more expensive grains. This is particularly the case in the sugar districts.

HANDLING THE FLOCKS.

Some flock-masters show a tendency at times to leave sheep too long in the one paddock. It is no rare thing, for example, to see sheep shorn, driven to a certain paddock, and left there until next shearing.

Sheep respond quickly to change of pasture, and the change is noticeable both in the health and condition.

A flock will often benefit, even if placed in a comparatively worse paddock than that on which it has been running for a brief period. On a breeding property, provision should be made for the ewes and lambs by spelling a paddock well before lambing time. Should rain fall while the paddock intended for the ewes and lambs is spelling, it is all to the good, as the succulent new growth so much to be desired for ewes and lambs will be in evidence. At weaning time there is again a necessity for fresh feed, for it should be fully realised that as a weaner a sheep is going through its most tender period. Grass seed country should be left severely alone where weaners are concerned.

The Dairy Farm

A Common Winter Defect in Milk and Cream.

Now that cooler weather is approaching, a flavour defect which is likely to be a frequent cause of trouble in milk and cream is tallowiness—a defect which, depending upon its intensity and stage of development, is usually described as metallic, oxidised, oily, mealy, cardboard, and ''cappy'' taint. Although tallowy and related flavours may be brought about by other influences, they are usually traced to the exposure of milk products to metallic contamination, notably copper from factory appliances and iron from dairy farm equipment.

The more common occurrence of these faults in winter depends upon the ability of minute traces of metals in solution in milk and cream to accelerate chemical changes between the oxygen normally present in these liquids and a certain constituent of butterfat, with the formation of compounds which impart the characteristic flavours. Such low concentrations as 0·2 part per million of copper and 1·5 parts per million of iron will impart an objectionable taint. In summer, when microbial development is most active in milk, the dissolved oxygen is rapidly used up by the organisms for their own growth, and so they actually help to prevent the onset of tallowiness. Their action in this single instance in retarding rather than promoting the deterioration of milk and cream is in striking contrast with their usual behaviour, as they are responsible for almost all the major faults which occur in milk products.

The most up-to-date factory processing is quite unable to renovate tallowy cream, which, therefore, is always classed as second or pastry grade. Dairy farmers should look over all metal utensils with which milk comes into contact, and any from which the tin coating has worn off, or which shows signs of rusty patches, should be retinned if their condition warrants the expense. Any piece of equipment which is too old or in a state of disrepair which does not justify the cost of retinning should be immediately dumped. The continued use of such unsatisfactory utensils during the winter months will almost certainly mean degraded cream and substantial monetary loss.

LOW PRODUCTION COST.

Many dairy farmers supplying milk have cows capable of giving more than the one or two gallons they produce, but an owner is often sceptical as to whether the extra food required will be paid for out of increased production.

A simple trial lasting a fortnight will show how to rearrange both feed and production. Arrange for those cows which can be reasonably expected to produce more to get the extra feed. It should take the form of concentrates. A simple mixture for the production of an extra gallon is 3 lb. of maizemeal and of high-quality meat meal. Gradually bring the animals under test on to the full feed—usually a week is adequate. Test over a further week.

The cost would not exceed sevenpence daily per cow. The increased yield in terms of cash than determines whether the particular cows under test are worth the extra feed. If they are, then it may pay to pension off low producers and apply the cost of their food to the purchase of concentrates for the proved animals.

In practically all cases, the food for two half-gallon cows or one one-gallon cow costs more than the extra feed which is to produce an extra gallon from a better milker.

The saving in labour is also worth consideration.

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THE STRAINING OF MILK.

On the most carefully managed farm, a certain amount of visible dirt finds its way into the milk. The term ''visible dirt'' covers such matter as dust, cow hairs, flies, and manure, as distinguished from bacteria, which are not visible to the naked eye. Bacteria may be present in milk which appears perfectly clean, fresh and pure—and their presence may not be realised until souring begins several hours after contamination. If visible dirt is present in the milk, however, bacteria will be there also, hence the necessity for straining through a suitable strainer. The cotton wool disc type prescribed by the Dairy Regulations is preferable to any other. It can only be used once, and there is no risk of contaminating fresh supplies of milk, as sometimes happens with a cloth strainer which has not been properly washed.

It is better to keep visible dirt out of the milk than to strain it out. Early straining is better than last-minute straining, for to some extent the longer dirt is allowed to remain in the milk the greater will be the number of organisms passing into the liquid. The process may be understood more clearly by a rough analogy with making a brew of tea. If the tea leaves are removed soon after the addition of the hot water, the tea remains weak. If they are stirred in the teapot, or left for any length of time, the brew becomes much stronger. Similarly, if dust and dirt are left in the milk, undesirable bacteria, with which every particle of dirt is teeming, pass into the milk and increase the tendency to early souring.

The milk from each cow should be removed immediately milking is completed and tipped through the straining disc into the receiving tank above the cooler. It will not require a second or even a third straining, for one straining, together with proper cooling, will be sufficient to give the milk a satisfactory keeping quality.

COMFORT FOR COWS ON COLD NIGHTS.

The dairy farmer who rugs his cattle during wintry weather usually reaps the advantage of an undiminished cream return. Many other farmers would like to follow suit, but are deterred by the cost of buying a good warm rug. There is no reason, however, why a farmer so placed should not make his own cow rugs. All that is required are the necessary number of corn sacks, a ball of twine, a packing needle, and ordinary ingenuity.

A warm rug can be made out of two corn bags, but for a big beast three bags might be necessary. Split the bags down the seams, sew them together, and place on the cow. After getting the right fit, cut off a strip of bagging so that the rug will not hang too low. This strip cut off may then be folded and sewn to the rug as a thigh strap. The front of the rug is then fitted by turning up the corners and sewing them to the sides of the rug. This strengthens the rug and obviates the necessity for cutting off the spare portion, which the cow would otherwise tread on. Neck and other fastenings may be easily fashioned to make the rug complete.

This home-made rug will keep the cow warm, and after a few days' wear will become practically waterproof. The rug can be slipped off and on quite easily, and it is advisable to remove it every day, except in bleak or rainy weather. Each cow's name may be painted on its own rug. Rugging will certainly increase winter milk production.

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THE MANAGEMENT OF THE BULL.

The bull should be kept away from the rest of the herd in a separate run securely fenced and provided with water and shelter. A small service yard and a crush to facilitate the handling of the bull when necessary, should also be provided.

The advantages gained by keeping the bull away from the herd are:—

1. Calving can be regulated.
2. It is easier to decide whether or not the cow is in calf.
3. The bull's services are controlled and not wasted.
4. There is less likelihood of the cows having to return to the bull.

If the run is placed well away from a public road any annoyance caused by a neighbour's cows breaking into the bull or the bull breaking out is avoided.

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CHANGES OF ADDRESS.

Subscribers are asked to kindly notify changes of address to this Department without delay.

Registered
Hatcheries

Name and Address.	Name of Hatchery.	Breeds Kept.
G. Adler, Tinana	Nevertire	White Leghorns, Australorps, Rhode Island Reds, and Langshans
F. J. Akers, Eight Mile Plains	Elmsdale	White Leghorns and Australorps
E. J. Blake, Rosewood	Sunnyville	White Leghorns, Australorps, White Wyandottes and Rhode Island Reds
J. Cameron, Oxley Central	Cameron's	Australorps and White Leghorns
M. H. Campbell, Albany Creek, Aspley	Mahaca Poultry Farm and Hatchery	White Leghorns and Australorps
J. L. Carrick & Son, Manly road, Tingalpa	Craigard	White Leghorns
N. Cooper, Zillmere road, Zillmere	Graceville	White Leghorns
R. B. Corbett, Woombye	Labrena	White Leghorns and Australorps
T. G. Crawford, Stratford	Rho-Isled	Rhode Island Reds
Dixon Bros., Wondecla	Dixon Bros.	White Leghorns
Rev. E. Eckert, Head street, Laidley	Laidley	Australorps, White Leghorns, and Langshans
Elks & Sudlow, Beerwah	Woodlands	Australorps and White Leghorns
W. H. Gibson, Manly road, Tingalpa	Gibson's	White Leghorns and Australorps
Gisler Bros., Wynnum	Gisler Bros.	White Leghorns
G. Grice, Loch Lomond	Kiama	White Leghorns
J. W. Grice, Loch Lomond	Quarrington	White Leghorns
Mrs. M. Grillmeier, Mount View, Milman	Mountain View	Australorps
C. & C. E. Gustafson, Tannymorel	Bellevue	Australorps, White Leghorns, and Rhode Island Reds
J. McCulloch, Whites road, Manly	Hindes Stud Poultry Farm	White Leghorns, Australorps, and Brown Leghorns
A. Malvine, junr., The Gap, Ashgrove	Alva	White Leghorns and Australorps
H. L. Marshall, Kenmore	Stonehenge	White Leghorns and Australorps
W. J. Martin, Pullenvale	Pennington	Australorps, White Leghorns, and Langshans
J. A. Miller, Racecourse road, Charters Towers	Hillview	White Leghorns

Name and Address.	Name of Hatchery.	Breeds Kept.
F. S. Morrison, Kenmore ..	Dunglass ..	Australorps, Brown Leghorns, and White Leghorns
Mrs. H. I. Mottram, Ibis avenue, Deagon	Kenwood Electric Hatcheries	White Leghorns
J. W. Moule, Kureen	Kureen ..	White Leghorns and Australorps
D. J. Murphy, Marmor ..	Ferndale ..	White Leghorns, Brown Leghorns, Australorps, Silver Campines, and Light Sussex
S. V. Norup, Beaudesert Road, Cooper's Plains	Norup's ..	White Leghorns and Australorps
H. W. & C. E. E. Olsen, Marmor	Squaredeal Poultry Farm	White Leghorns, Australorps, Black Leghorns, Brown Leghorns, and Anconas
A. C. Pearce, Marlborough ..	Marlborough Stud Poultry Farm	Australorps, Rhode Island Reds, Light Sussex, White Wyandottes, Langshans, Khaki Campbell and Indian Runner Ducks, and Bronzewing Turkeys
E. K. Pennefather, Oxley Central	..	Australorps and White Leghorns
G. Pitt, Box 132, Bundaberg ..	Pitt's Poultry Breeding Farm	White Leghorns, Australorps, Langshans, Rhode Island Reds, and Brown Leghorns
J. Richards, Atherton	Mount View Poultry Farm	White Leghorns and Australorps
C. L. Schlencker, Handford road, Zillmere	Windyridge ..	White Leghorns
A. Smith, Beerwah	Endcliffe ..	White Leghorns and Australorps
T. Smith, Isis Junction	Fairview ..	White Leghorns and Langshans
H. A. Springall, Progress street, Tingalpa	Springfield ..	White Leghorns
A. J. Teitzel, West street, Aitkenville, Townsville	Teitzel's ..	White Leghorns
W. J. B. Tonkin, Parkhurst, North Rockhampton	Tonkin's Poultry Farm	White Leghorns and Australorps
W. A. Watson, Box 365, P.O., Cairns	Hillview ..	White Leghorns
G. A. C. Weaver, Herberton road, Atherton	Weaver's Stud Poultry Farm	Wyandottes, Indian Game, Barred Rocks, Australorps, White Leghorns, Anconas, Rhode Island Reds, Buff Orpingtons, Black Orpingtons, and Buff Leghorns.
T. Westerman, Handford road, Zillmere	Zillmere ..	Australorps and White Leghorns
P. A. Wright, Laidley ..	Chillowdeane ..	Brown Leghorns, White Leghorns and Australorps
R. H. Young, Box 18, P.O., Babinda	Reg. Young's ..	White Leghorns, Brown Leghorns and Australorps

NEW REGISTRATIONS.

Following is a list of those who have applied for the registration of their hatcheries up to the 24th April, 1939:—

Name and Address.	Name of Hatchery.	Breeds Kept.
J. Caspaney, Kalamia Estate, Ayr	Evlington ..	White Leghorns
Dr. W. Crosse, Musgrave road, Sunnybank	Brundholme ..	White Leghorns, Australorps, and Rhode Island Reds
W. J. B. Foxwell, Coomera ..	Foxwell's ..	White Leghorns and Australorps
P. Haseman, Stanley terrace, Taringa	Black and White	Australorps and White Leghorns
C. Hodges, Kuraby	Kuraby ..	Anconas and White Leghorns
H. K. Roach, Wyandra	Lum Burra ..	White Leghorns and Australorps

EFFECT OF CLIMATIC CONDITIONS ON DIFFERENT CLASSES OF POULTRY.

Two classes of birds are generally used by commercial farmers—light breeds, such as Leghorns, Anconas, and Minorcas; and heavy or dual-purpose breeds, such as Australorps, Wyandottes, and Rhode Island Reds.

Light breeds, as a rule, are of a "highly strung" nature, and very susceptible to climatic changes, particularly during the early periods of production. Rains and cold snaps will invariably check production with this type of bird. This is particularly noticeable if the birds are not housed under the intensive system. If false moults are to be avoided, the highly strung nature of the birds also makes it inadvisable to alter their location until they have settled well into production and until spring approaches.

If, for any reason, light breeds have to be handled before the middle of, say, July, go about the work quietly and, if at all possible, work only in the afternoon, for most of the birds to lay on that day will have done so by then.

The dual-purpose breeds, on the other hand, are more docile and quiet. They are not so easily disturbed by climatic changes during the early laying stages, but are more susceptible to heat, as many dual-purpose birds lay on fat. In selecting breeders, select against this characteristic and choose the most active, alert birds. Greater liberties can be taken with dual-purpose breeds in relation to change of quarters, but do not worry them or shift them during early winter, as they are not immune from false moults.

NUTRITIONAL REQUIREMENTS OF POULTRY.

Poultry-raisers as a whole have a very fair idea of the principles and practice of feeding, and take into consideration factors which make for efficient and economic production.

The present-day values of cereals may induce some to depart from old and accepted practices in order to reduce costs. There are three points, however, that must not be lost sight of, if the best results are to be obtained and the general health of the stock maintained—viz., the vitamin content of the ration, the protein content, and the quantity supplied.

Vitamins.—Vitamin A is of outstanding importance at the present juncture, for a shortage in the ration may cause outbreaks of nutritional roup as well as lowered egg production. The feeding of yellow maize and green feed ensures a sufficient supply of this vitamin.

On most poultry farms during the winter months green feed is not plentiful; consequently under normal circumstances the loss due to a shortage of maize cannot be overcome. It is therefore of paramount importance that the poultry-raiser should make a special effort to supply the birds with good succulent green feed. Green feed is the cheapest form in which the birds' requirement of this vitamin can be supplied. In cases where home-grown feed cannot be obtained, poultry-raisers should use at least 10 per cent. of good green lucerne chaff or meal in the mash fed to their birds.

Protein.—To obtain the maximum economic production, laying birds should have in their ration (i.e., grain and mash) a total of approximately 15 per cent. of crude protein. Maize has about 10 per cent. and wheat about 13 per cent. of protein. Where maize has been used extensively and is replaced with wheat it may be desirable to reduce slightly the protein content of the ration. This is most easily brought about by a slight reduction in the meat meal fed.

Generally speaking, however, the protein-rich meat meal is not overfed, and its greater use is advisable in certain circumstances. This is particularly so in the case of the poultry-raiser who feeds extensive quantities of skim milk to his birds. With the approach of winter the milk supply will probably diminish. In such cases the loss of protein of animal origin in the form of milk should be supplemented with meat meal.

Quantity.—Providing the right kind of food is being used, economic production is only possible by feeding the birds all they will consume. Do not be afraid of making your birds unduly fat. The good producer will convert the food supplied in excess of body requirements into eggs. Birds which cannot do this should be culled and sold for table purposes.

MARKING EARLY LAYING PULLETS.

The marking of early laying pullets provides a practical method of selection where the trap nest is not used.

Records obtained by trap nesting in various parts of the world show that—

(1) Early laying pullets are, as a rule, the highest producers;

(2) Birds that lay late into the autumn and are late in moulting are also high producers.

As the early layers and late moulters are high producers, a marking system will assist in distinguishing between profitable and unprofitable fowls.

In one convenient system of marking, a coloured leg band is placed on the left shank of all pullets that start to lay before six months of age. A band of another colour is attached to the left shank of pullets starting to lay when six and seven months of age, and a third coloured band is used for fowls which commence to lay in the eighth month. Pullets that do not lay until after the eighth month should be eliminated from the flock, or kept in a pen by themselves, and forced for egg production.

Pullets which are early layers show the following characteristics:—

(1) A large red comb;

(2) An active disposition and a ravenous appetite;

(3) Roominess between the keel and pelvic bones;

(4) An occasional disappearance of the yellow coloration round the vent in some yellow shanked varieties.

In small flocks, individuals showing the above characteristics may be caught in the nest and then marked.

During the following season, all fowls that were marked as late maturing the previous autumn and moult in December, January, and February can be culled. All the early laying birds and those that moult after 1st March may be kept for layers or placed in a special breeding pen and mated to a male known to have come from a high laying hen that has been trap nested. In this way the egg production of the offspring may be raised.

The method outlined is simple and, if properly employed, will raise the level of production in a flock.

Agricultural Notes

Control of Army Worms.

Early action should be taken by any farmer who notices even a small army worm infestation on his farm.

The eggs are laid by the parent moths, and if the caterpillars hatch in any numbers they cluster or group into bands or armies, hence the name "army worm." They feed over the ground outwards from the original centres of infestation, and in a typical attack they form a dense line or band of caterpillars slowly advancing in a face over a grassland or through a crop, often eating the foliage down to ground level. The typical army worm food plants include pasture grasses, fodder crops, and grain crops.

When full grown, the caterpillars enter the soil and change to the chrysalis from which later the moth emerges. Second generation eggs may then be laid. As a general rule, an outbreak runs for a few weeks, at the end of which natural parasites take charge, but, in that period, considerable damage both to pasture and crops may occur, and, for that reason, control measures should always be commenced immediately the caterpillars are seen.

The most effective control measure requires the use of poison bran bait. This should be lightly broadcast along and for a width of about 6 feet in front of the advancing line of army worms when the attack is on grassland. What little of the bait that remains on the baited strip after the caterpillars have fed on it will gradually trickle to ground level out of reach of stock. In the meantime, however, stock should be kept from the baited area, and, in any case, it must be remembered that the bait should be lightly and thinly broadcast, otherwise there may be some danger to stock. If the suitable precautions are taken the bait, however involves no risks. If the bait is applied to a standing crop such as Sudan grass or panicum which is to be fed off or cut for fodder, then some of the poison flakes will lodge in the foliage and may constitute a danger. Therefore, in baiting for an army worm infestation that is invading a crop, the following procedure should be adopted. A strip should be scythed through the crop just in front of the advancing army worms and the cut plants removed or raked aside to expose bare ground. If practicable the soil in this strip area should be stirred. The poison bran bait may then be broadcast on the strip of bare ground.

The bran bait mixture consists of 25 lb. bran, 1 lb. paris green, 4 lb. molasses, 2 gallons water. The bran and paris green should be thoroughly mixed together dry. The molasses should be dissolved in the water. The sweetened fluid should then be poured on to the bran in a suitable mixing vessel and the whole thoroughly mixed to a moist, loose, friable mash.

If paris green is not immediately available and stocks of arsenic pentoxide are on hand, the latter poison may be substituted. Only ½ lb. arsenic pentoxide should be used to 25 lb. bran, and in this case the poison should be dissolved in a little hot water and then added to the molasses solution which is then mixed into the bran.

Both paris green and arsenic pentoxide are arsenical poisons; stocks should, therefore, be stored with care and the mixing vessels and hands should be carefully washed after preparing and using the bait.

In special circumstances it may be desired to use a spray for the control of army worms. Excellent results have been obtained with a crude oil emulsion. This spray is non-poisonous to animals, but it will kill both the caterpillars and the treated portion of the plants. If used it should be sprayed on the strip of pasture or fodder plants that is heavily infested, and, preferably, the spraying should be carried out in the warm part of the day.

The crude oil emulsion is prepared as follows:—Half a pound of hard soap is dissolved in a gallon of water by boiling; the container is then removed from the fire and 2 gallons of crude oil is immediately added to it. The mixture is then stirred vigorously and churned by means of a spray pump for five to ten minutes. The stock solution, when properly emulsified, looks like strong milk coffee. For use, the solution is diluted one part of stock to seven parts of water.

Although the spray formula is given, it must be pointed out that in most cases involving the control of army worms the bran bait method is the most satisfactory. In cases of dense infestation, several repeat sprayings would be necessary in order to deal with the bands of caterpillars reformed from the stragglers.

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CROP ROTATION.

Rotation of crops is generally necessary in most systems of farming if the fertility and physical condition of the soil are to be maintained. Apparently, every crop requires some particular combination of plant foods, and by growing the same crop season after season on the same soil, a depletion of the main plant foods required by that crop results. Hence, after continuous cropping for some years, yields may become unprofitable. By growing different crops in rotation, the productivity of the soil may be maintained or even improved in the case of naturally inferior types of soil.

Rotational systems vary with the climatic conditions and the range of profitable crops.

Crops used in rotational systems in various parts of the world are frequently grazed off by stock, or harvested for fodder. Any accumulated manure is thus returned to the land. Where such systems are practised, the organic matter ploughed in as dung assists in maintaining the soil in a satisfactory physical condition. Where stock-raising is less important, a green manure must be included in rotations, which include nitrogen-requiring crops, to obviate any excessive depletion of nitrogen and organic matter. If climatic conditions are suitable, crops such as cowpea, soy bean, clovers, and other legumes can be grown and ploughed under as green manure. Such green manuring usually increases the yields of the following crops.

In dry areas, green manuring has not proved so beneficial, as the organic matter decomposes rather slowly. Long fallows have therefore been developed, particularly in wheat-growing districts. When the crop is harvested, the land is ploughed as early as possible and left in a rough state to trap all subsequent rains. If the crop is stripped, the standing straw should be burned before ploughing, otherwise it may be difficult to obtain a compact seed-bed, and there is some risk of the following crop being deprived of nitrogen.

Crop rotation has received little attention in Queensland, because of the natural fertility of soils which have only been cultivated for a comparatively short period. Climatic conditions have also favoured the cultivation of a particular crop within a well-defined area. As a result, crops such as wheat, cotton, peanuts, and arrowroot are more or less confined to districts which have proved suitable for their successful production.

The need for a more diversified farming system, using a variety of crops in rotation, is clearly necessary in some old cultivations where specialisation in one crop has both decreased fertility and impaired the physical condition of the soil.

Properly devised rotational systems can be expected to yield larger crops, to ensure economy in the use of manures, and generally result in the more profitable working of the available land.

CROPS FOR WINTER AND SPRING FEED.

For winter and spring feed in coastal areas which usually have a fair winter rainfall, the winter cereals, wheat, oats, barley, and rye, are strongly recommended. If these crops are combined with a legume, such as field peas or vetches, the nutritive value of the fodder is greatly enhanced.

Sowings of these crops may be continued during May. If seasonal rains are delayed, sowings may be extended until early in July, but with such late sowings the crops will only be available for a short period.

In the absence of seed drills, broadcasting is usually adopted, sowing the legume first, and discing or ploughing it under, following with the cereals, which are broadcast and harrowed in.

Suitable varieties are:—Wheat—Florence, Warren, or Warchief; oats—Sunrise, Belah, or Algerian; barley—Skinless. Florence wheat, 30 lb., combined with Dun field peas at the rate of 20 lb. per acre, has proved a suitable mixture, as both are early maturing. Algerian oats, 30 lb., combined with vetches at the rate of 20 lb. per acre, make also a suitable combination, particularly for early sowing, as this mixture is considerably slower in maturing than the former. The early maturing varieties of oats, such as Belah and Sunrise, may also be sown with field peas if desired.

If individual crops are sown, the following rates of seeding per acre are recommended; wheat 60 lb., barley 50 lb., oats 50 lb., rye 50 lb., field peas 40 lb., vetches 30 lb.

The crop should be cut and fed direct to stock as, where grazing is practised, wastage occurs through tramping.

Rape may also be grown now and during the winter months to provide an abundance of succulent feed for both sheep and pigs. Rape is not so suitable for dairy cattle, because of the taint which it may impart to milk, and to its tendency to induce bloat.

Rape may be sown early in May, drilling in 4 to 5 lb. of seed per acre. Broadleaf Dwarf Essex is the best variety.

The root crops, mangels, sugar beet, Swede turnips, and kohl-rabi, may also be sown on land which has been well prepared.

A "Planet Junior" cultivator and seeder is a useful implement for this work, the seed being sown in rows 2½ feet apart, and the plants being thinned out to 1 foot intervals. Sow mangels and sugar beet at the rate of 5 to 7 lb. per acre, Swede turnips 2 to 3 lb., and kohl-rabi 2 lb.

QUEENSLAND SHOW DATES, 1939.

May.

Blackall	8th and 9th
Roma	9th to 11th
Mundubbera	10th and 11th
Beaudesert—	
Show	10th and 11th
Bushmen's Carnival	12th and 13th
Murgon	11th to 13th
Barcaldine	16th and 17th
Goomeri	16th and 17th
Ipswich	16th to 19th
Mitchell	17th and 18th
Gayndah	17th and 18th
Dirranbandi	19th and 20th
Blackbutt	19th and 20th
Warrill View	20th
Kilkivan	19th and 20th
Charleville	24th and 25th
Biggenden	25th and 26th
Gympie	25th to 27th
St. George	26th and 27th
Kalbar	27th
Maryborough	30th and 31st May and 1st June

June.

Biloela	1st and 2nd
Lowood	2nd and 3rd
Childers	5th and 6th
Boonah	7th and 8th
Bundaberg	8th to 10th
Wowan—	
Show	8th and 9th
Rodeo	10th
Gin Gin	12th and 13th
Gladstone	15th and 16th
Rockhampton	20th to 24th
Toogoolawah	23rd and 24th
Mackay	26th to 29th
Kilcoy	30th June and 1st July
Proserpine	30th June and 1st July

July.

Bowen	5th and 6th
Ayr	7th and 8th
Cleveland	7th and 8th
Esk Show and Campdraft	7th and 8th
Townsville	10th to 13th
Nambour	13th to 15th
Rosewood	14th and 15th
Charters Towers	18th to 20th
Laidley	19th and 20th
Maleny	20th and 21st
Innisfail	20th to 22nd
Cairns	25th to 27th
Gatton	25th to 27th
Caboolture	28th and 29th
Tully	28th and 29th

August.

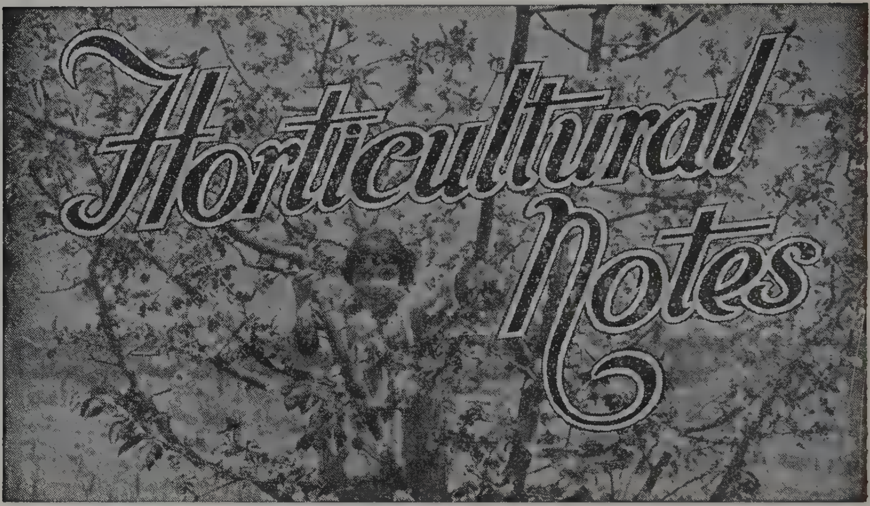
Atherton	1st and 2nd
Crow's Nest	2nd and 3rd
Pine Rivers	4th and 5th
Home Hill	4th and 5th
Ingham	4th and 5th
Royal National, Brisbane	14th to 19th
Jericho	25th and 26th

September.

Imbil	1st and 2nd
Canungra	2nd
Pomona	8th and 9th
Rocklea	9th
Mount Tamborine	9th
Beenleigh	22nd and 23rd
Malanda	27th and 28th
Southport	30th
Ithaca	30th

October.

Nerang	6th and 7th



Handling of Citrus Fruits.

The harvesting of citrus fruits will soon be in progress, and for several weeks to come growers will be chiefly concerned in the marketing of their crops.

Care in the handling of citrus fruits pays the grower handsomely. Rough handling contributes towards wastage losses in export fruit and in fruit being held by local markets, chiefly because of green and blue moulds, which are familiar to every citrus-grower.

These moulds are fungal parasites disseminated by means of spores which gain entrance to the fruit mainly through bruises and skin abrasions.

The healthy unbroken skin of the orange is proof against almost all decays.

Abrasions may be caused during picking operations by the finger nails of careless pickers, or by allowing the clippers to cut into or prick the rind of the fruit when cutting the stem.

By the use of clippers with cup-shaped blades and rounded points, there is no excuse for the fruit being clipper-cut whilst the gloves on the hands will prevent finger-nail injury.

All stems should be cut off short and smooth, otherwise they are likely to puncture the skin of other oranges during handling.

Another source of damage is protruding nails on the inside of the picking boxes, the points pricking into perfectly good oranges, causing punctures through which spores may enter.

The picking boxes should be well made; the internal surfaces of the boxes should be finished smooth to avoid friction during transit of the fruit from the orchard and the packing shed.

It is not only necessary for the orchardist himself to be careful, but he must also see that his employees are not negligent.

In the packing shed most growers make some provision to ensure cleanliness; nevertheless, there are some who do not appreciate the obvious necessity for hygiene. Occasionally uncovered buckets and tins are observed containing mouldy fruits in various stages of breakdown which are allowed to accumulate from day to day. Where this occurs, those responsible for the cleanliness of the shed fail, apparently, to realise the enormous number of spores produced from mouldy fruit which are dispersed in the form of "mould dust" capable of reproducing the same decay in all punctured and bruised fruit with which it comes in contact. It is essential that all waste and reject fruit which accumulates during each day's work should be effectually destroyed daily by burning. Moreover, a frequent washing of the floors of the packing shed with a ½ per cent. caustic soda solution or other suitable fungicide, will reduce mould contamination within the shed.

TOMATOES IN FROST-FREE AREAS.

Growers in the frost-free areas along the North and South Coast districts will soon be busy with successive plantings of tomatoes.

The tomato does well on several types of soils provided they are well drained, although a rich loamy soil is preferable. The plants should be well supplied with plant foods, but should not be too liberally treated with nitrogen, which will tend to produce a large plant throwing late fruit. Fertilizers should be rich in phosphoric acid and potash, with just sufficient nitrogen to produce a good but not over-luxuriant growth. A complete fertilizer can be made up as follows:—

420 lb. sulphate of ammonia
700 lb. superphosphate
560 lb. bonedust
560 lb. sulphate of potash

2,240 lb. (used at the rate of from 3 to 5 cwt. per acre).

The method of planting will be determined by the system of training to be adopted. Where trellising or staking is to be practised, the rows may be 3 feet apart, and the plants in the rows from 15 to 18 inches apart. The rows should, if possible, run north and south. When not staked or trellised, the rows require to be at least 4 to 6 feet apart and the plants 4 feet apart in the rows.

The tomatoes may be trained on a trellis or staked. In the latter instance, stakes 5 feet long are driven into the ground alongside each plant when they are about 1 foot in height. As the plant grows, the lateral growth produced from the axils of the leaves is removed. Further growth is thus limited to single or double stems, which are tied to the stakes at intervals.

Pruning tends to promote the formation of flower clusters and the setting of fruit. When several flower clusters have been produced, the leader or leaders are checked at one or two leaves above the last flower cluster.

The plants should receive regular attention, and lateral growth should be restrained until it is time to check the leaders. In this way the energies of the plants are directed towards the growth and maturing of the fruits and the tendency to shed first blossoms and fruit is reduced.

Trellising or staking, together with pruning, permits the maximum amount of light and air to reach the plants, thus decreasing their susceptibility to disease.

CABBAGE-GROWING FOR MARKET.

The cabbage is one of the most important vegetables for the market gardener. It grows best in the cooler districts, but by carefully selecting varieties the crop may be grown in most parts of Queensland.

The seed should be sown in beds of well-drained, deeply and thoroughly worked soil. The soil, if heavy, should be improved by the addition of sand or decayed vegetable matter; if poor and sandy, the addition of a loamy soil or well-rotted manure will be beneficial.

The surface of the bed should be fertilized and firmed, and the seed sown thinly in shallow drills about 4 inches apart. After sowing, mulch the bed with well-rotted leaf mould to prevent excessive evaporation of moisture.

The seed-bed must be watered regularly, for a check in the growth of young seedlings is often followed by unsatisfactory results.

When large enough to handle, the seedlings should be thinned to an inch apart, for if grown too thickly they develop into long, spindly, weak plants.

Shading during the hottest part of the day is often necessary, but this shade should be removed as soon as the plants are strong enough to withstand the heat. Overshading also produces spindly plants. Approximately 1 lb. of seed will provide sufficient plants for an acre of cabbage.

In about six weeks the young plants should be large enough for transplanting. They may then be hardened off by restricting water supplies for a day of two before their removal to the field. Transplanting should be done in cloudy or showery weather, but if weather conditions are unfavourable the young seedlings should be watered in, and, as a further precaution, the top half of the leaves may be trimmed off to lessen transpiration until the root system is established.

Loosening of the soil in the seed-bed with a fork before lifting the plants helps to save many of the small roots. If the bed has been well soaked previously, the plants will lift with a ball of soil adhering to the roots, which will help to keep them moist.

The roots of the young plants should be kept damp after removal from the bed, and this may be done by standing them in a bucket containing a puddle of soil and water.

In planting, a hole is first made in the ground with a dibble—an old spade or digging fork handle is suitable. The hole should be only deep enough to allow the roots of the seedling to reach the bottom of the hole. Turn in a little earth, and then draw the plant slightly upwards before pressing the soil firmly around it. This ensures that the main root will not be doubled up.

The plants should be in rows 3 feet apart; in the rows the smaller varieties should be spaced 2½ feet and the larger varieties 3 feet apart. The growth of cabbages should on no account be checked. Regular cultivation and watering are, therefore, essential.

The right varieties should be selected for different times of the year. Winter-planting types should be early and quick maturing.

In the cooler areas, seed of the early varieties is sown during autumn. Main crop varieties are sown between August and December. The coastal districts are best suited to the winter crop.

Cabbage should be marketed as soon as possible after cutting, and only good firm-hearted vegetables should be sent for sale. Care in handling is essential, and when placed in bags for railing they should be packed as firmly as possible.

Recommended varieties are:—

Early.—Early Allhead and Early Drumhead, both of which are large, early, and quick growers.

Main Crop.—Succession is the most popular variety, and may be grown almost any time. It is a good large Drumhead type.

Surehead is slightly larger than Succession. It is hardy, and may be planted closer in the rows, as it has fewer outside leaves.

PARSLEY.

Parsley will grow almost anywhere and on any kind of soil which is not of too stiff a nature, although a partially shaded position and a rich, moist soil suit it best. Being a biennial, it must be sown each year in order to provide a continuous supply. It should be sown twice a year—in March and April for use in winter and spring, and again in August and September for use in summer. Seeds may be sown in shallow drills in the open ground, and the seedlings thinned out to about 6 inches apart. It frequently happens that parsley is sown too thickly and early thinning is neglected, with the result that the plants run to seed prematurely. Instead of sowing a continuous row, drop a few seeds along the drill at 6-inch intervals, and when the seedlings have developed several leaves remove all but the strongest plant in each group.

PARSNIP GROWING.

Although the parsnip is a native of England and must therefore be classed as a temperate climate vegetable, it may be grown with reasonable success in the tropics during the winter season.

Soil for growing this vegetable should be deep, rich, and free. A good sandy loam gives excellent results. The soil should be prepared some months previously by trenching or cultivating deeply, and incorporating a heavy dressing of stable manure. Organic manures should never be applied in considerable quantities immediately before planting this crop, as they frequently induce forking of the roots. At the end of the wet season the ground should be thoroughly worked up and reduced to a very fine tilth. The seed is then sown thinly and very lightly raked over, after which the soil should be rolled or well packed down with the back of a spade along the drills. The packing is necessary to ensure close contact between the seeds and the soil. A light covering of old horse manure well crumbled or old sawdust will assist germination by preventing the caking of the surface soil.

As soon as the seedlings are well up, thin them out where they are overcrowded and when about 4 to 6 inches high thin out finally to about 8 inches apart.

Parsnip seed is usually of rather poor germinating capacity, and is practically useless unless quite fresh.

WALNUTS.

Walnut trees grow well in the cooler parts of Queensland where there is a plentiful water supply and deep and well-drained soil. The trees are ornamental and shady, and there is a good demand for the nuts. The trees should be planted in August or September about 30 feet apart. For a few years after planting, all the training necessary is to cut out crossing limbs and to top the most vigorous shoots in order to form a well-balanced tree; subsequently, little pruning is necessary. Seedlings may be raised in a nursery bed and planted out when twelve months old, but as these may take many years to come into bearing and may not bear large crops of good nuts, it is more satisfactory to buy worked trees of tested varieties (Wilson's Wonder, Freshford Gem, and Franquette are recommended). The nuts fall to the ground when ripe, and to prevent losses by rotting should be gathered frequently and properly dried before bagging. Nuts to be used for seed should be gathered as soon as they have fallen from the tree, and soaked in water for a week just before planting. The best time to plant the seed is about the middle of July.

SELECTING NEW BANANA AREAS.

With the approach of winter, intending banana-growers would be well advised to give serious consideration to the selection of the areas shortly to be felled for the 1939 planting.

Of late years, bananas have been grown extensively and fairly successfully on inferior forest country, but, in most instances, a suitable aspect, assisted by good cultural methods, has been the chief factor towards success.

The best aspect, of course, is the north-east or northerly slope, with standing timber on all four sides to give the necessary shelter from strong winds, and these aspects ensure the maximum amount of winter sunshine.

With sites facing any further into the east than north-east, great care should be taken that, as far as possible, the area is sheltered from the cold south-east winds. An efficient windbreak on the south side of an easterly patch should, therefore, be provided for in the clearing plan. The site chosen should be so situated that tall timber or hills at the top of the proposed area will not shut out the winter sun at an early hour.

A north-westerly slope is preferable to south-east, south, or south-westerly slopes if heavy belts of timber block the strong westerly winds. Many good bananas have been grown on westerly slopes of this description, chiefly because the areas in question receive the sun during the whole of the afternoon.

All southerly slopes should be definitely avoided, more particularly if there is open country for any distance around the proposed area. Much more timber will have to be felled than actually required for planting, to obviate the long shadows which standing timber at all close to the patch throw over the plantation. The limited period during which they are exposed to the sun is the chief objection to all southerly slopes.

A good warm-slope plantation will produce from two to three bunches to every one on the cold-slope areas. Production costs, particularly to the grower on leased ground, enter so largely into the picture that intending growers with a choice of ground should always choose a warm situation to gain the best results.

BANANAS IN AUTUMN.

During autumn trashing is an important job in the plantation, for it both minimises black end and anthracnose trouble, and allows the free access of air and sunshine, the latter being of the greatest value during cold weather.

Trashing stimulates the rate of sucker growth, and some growers, even though their areas are on unprotected windy slopes, claim that autumn trashing is preferable to treatment at the end of the winter.

In young plantations where growth has been slow, and in which the plants are now carrying their first bunch, an application of fertilizer would be helpful. A suitable dressing would be 1½ lb. of superphosphate, 1 lb. of sulphate of ammonia, and from ½ to 1 lb. of muriate of potash applied per stool and well incorporated with the soil. Such a dressing should have been applied during March, but growers who neglected to treat their plantation, or whose area has suffered a setback through weather conditions, will find an application later on very beneficial. Without some such assistance, it is quite possible that fruit thrown during April will take six months to mature. Very slow-maturing fruit is, of course, undesirable.

In the older plantations, heavy fertilizer applications may be unprofitable. Areas which are not remunerative should, therefore, be eradicated if the financial prospects do not warrant their further maintenance.

It is well worth while tagging a few bunches throughout the whole of the plantation, these tags carrying the date on which the bunch is thrown. When the bunch is cut the period of development can very easily be calculated. In this way the grower can find out which section of the plantation produces more rapidly. These areas will, of course, be the most profitable.

The marketing of immature fruit is undesirable. If necessary during winter, the top hand on the bunch should show traces of colour.

Growers with exposed plantations should, as cooler weather advances, bag their bunches to protect them from the cold. The fruit from bagged bunches matures fairly rapidly, and is very much better in quality than unprotected fruit. Second-hand bags may be used for the purpose, but any cost involved is amply repaid by increased returns to the grower.

RIPENING OF BANANAS.

To ripen bananas on a large commercial scale a properly constructed room, or rooms, with insulated walls are necessary. Probably the most convenient size for such a room would be 12 feet long by 8 feet wide by 7 feet 6 inches high, such measurements allowing for 100 cases capacity. Factors that must be taken into consideration when building ripening rooms are insulation, air circulation, ventilation, cooling, heating, and humidity control. Details are set out in the C.S. and I.R. Bulletin, No. 64, which is available to anyone interested.

To ripen bananas for home consumption, or a small local trade, is an entirely different proposition. Directions covering such work are as under:—

Allow the fruit to become fully matured prior to cutting. After harvesting, cut the hands off and allow them to drain for one hour. Obtain a 50-lb. tea chest or similar box. Stand it upon two pieces of 3-feet by 2-inch timber to permit a current of air to pass between it and the floor. Pack the hands of bananas carefully round the inside of the chest, being sure to leave the centre open. Next, place a small handful of carbide in the centre of the chest and cover over in a manner that makes the inside of the chest or box as near to airtight as possible. Two or three thicknesses of canvas, or four thicknesses of corn sacks, are usually satisfactory.

Take the covering off after sixteen hours and recharge by placing another small handful of carbide on the floor of the chest. Recover it and allow it to stand for a further twelve to sixteen hours, after which uncover it and the fruit then will be almost ready for sale. If not quite ready cover it, but without carbide.

In very warm weather, only one application of carbide may be necessary. Ventilating the chest after sixteen hours is very necessary. Keep the chest in the shade away from the direct rays of the sun.

VARIETIES OF APPLES AND PEARS.

Orchardists in the Stanthorpe district who may be planning a planting programme for the coming season are advised to place their orders with reliable nurserymen without undue delay. Early ordering ensures early delivery of the young trees.

As regards varieties to plant, the Granny Smith is likely to be the best commercial apple for many years to come. If reasonably well treated, it will give a good crop every year.

Some growers are inclined to think that the market will be overloaded with Granny Smith apples when young trees already planted come into bearing. This is not likely to happen.

The Stanthorpe Granny Smith is equal to if not superior to any grown in the Commonwealth. The keeping qualities are good, and far more should be cool-stored than at present. Stanthorpe apple-growers should try to supply the requirements of their own State with Queensland-grown apples as long as possible by using the available cold-storage facilities.

If the Granny Smith crop in the Stanthorpe district were doubled, or even trebled, there should be no difficulty in marketing the fruit at existing or even enhanced prices.

In addition to the Granny Smith, which should be the main variety, Delicious, Lalla (Red Delicious), Winesap, and Red Statesman are good types.

Red Statesman and, in addition, Dougherty are eminently suitable for the late ''private order'' trade. Growers who specialise in this trade should cater for their customers over as long a period as is possible. Stocks are frequently exhausted long before they should or need be, and then supplies have to be drawn from elsewhere.

The Gravenstein is a good early dessert apple well worth growing. On account of its susceptibility to gnarl or twist, it is advisable to grow a scaffold tree of another strong-growing variety, such as Delicious, and then rework with Gravenstein scions from selected trees free from the trouble.

Growers should be wary of planting new varieties of apples. Generally it is a good plan to plant only standard varieties and let someone else do the experimenting. Though new varieties may have good characteristics, they are seldom better than those already grown, and being unknown to the trade or the householder the fruit is viewed with suspicion and is difficult to market.

As regards pears, the best commercial varieties are Williams Bon Cretien, Packhams Triumph, and Beurre de Box—all are good growers and croppers.

The Winter Cole is a late-maturing variety which is popular in the other States. Stanthorpe growers should, however, limit their plantings of this variety on account of possible fruit-fly attacks at the end of the season.

—*H. St. J. Pratt.*

THE "ORPHAN" TREE.

Many failures are observed where replacements are made in a bearing deciduous fruit orchard. Frequently, the young tree remains like an unwanted orphan and shows only stunted growth. If it is to catch up to the other trees and fill in an unsightly and unprofitable blank space in the orchard, careful attention must be given to all details in its management.

The main causes of failure are:—

1. The lack of natural plant food for the young tree.
2. If the old replaced tree died from the attacks of some particular diseases, the replant may be attacked in turn and suffer an initial setback.
3. Searching roots of adjacent trees may compete successfully with those of the young tree for the available plant food.
4. Lack of attention.

When digging out the unhealthy tree, carefully remove and burn all the roots together with the tree. Leave the hole open and exposed throughout the winter, and just prior to planting in spring fill with a load of virgin soil to which may be added some well-rotted animal manure. Virgin soil is obviously richer in plant nutrients than soil which has been cropped exhaustively for some considerable time.

The young tree is very often forgotten and does not get the necessary attention at the right time. Weed growth may tend to choke it, but this difficulty can be simply overcome by the use of an old fertilizer bag. The bag is opened out and, after making a cut in the middle, is slipped over the young tree. This makes an excellent mulch which keeps down weed growth in the vicinity of the tree and conserves the moisture so necessary for its progress.

THE SUGAR BANANA.

The sugar banana has been grown profitably for all the "bunch" trade markets in Queensland. Small, sweet, and delicately flavoured, this fruit claims many staunch supporters.

For the production of this banana deep, warm alluvial flats, favoured with a generous rainfall or watered by irrigation, are most suitable. As with other varieties, good drainage is essential. As the sugar banana possesses a slender stem, damage by wind must be guarded against, and where there is no permanent windbreak it is worth while establishing one at the time of planting. For this purpose double border rows of lady fingers or sugar banana plants may be planted 7 feet apart in the row and 7 feet between the rows. The spacings in the inner row should actually lie between the spacings in the outside row—i.e., planted according to the septuple system. These two rows close quickly in towards each other and rapidly form an effective windbreak. Of course, the planting of a permanent windbreak of suitable trees would be far more valuable on account of their permanency, provided the cultivated area is reconditioned from time to time.

Prior to planting, the soil should be worked to a depth of at least 12 inches and reduced to as fine a tilth as possible. The holes for the young plants in the plantation area should be 14 feet apart, 15 inches deep, and 18 inches square. The rows should be lined out as straight as possible each way, thus allowing the greatest convenience in working horse-drawn cultivating implements.

Opinions differ somewhat in the matter of selection of planting material, but generally a vigorous young sucker about 4 feet high dug from a matured stool is most favoured. The top portion of the sucker should be removed, leaving a plant of 3 feet in height to place in the hole. The plant is placed in position within the hole and sufficient surface soil placed in around it to fill approximately two-thirds of the actual cavity. The rest of the cavity is filled in gradually as the ground is cultivated during the ensuing year. According to the quality of the soil, one or two followers are allowed to come away, and, normally, the first bunches will be harvested seventeen or eighteen months after planting.

Farmyard manure applied judiciously to sugar banana plantations will repay the grower handsomely. Light horse-drawn implements are satisfactory for cultivating, and green crops, such as Poona and field peas, are excellent soil invigorators, provided they can be turned back into the soil at the correct time—i.e., when still very soft and succulent.

As the sugar banana is usually marketed in the bunch and the fruit possesses a thin, delicate skin, special care in handling is necessary in order to obtain the best market returns. —*E. P. Williams.*

The Fruit Market.

J. H. GREGORY, Instructor in Fruit Packing.

THE rains still continue, the soil being thoroughly soaked for the first time in many years. The feeling of all sections of the community is now one of optimism.

Prices for all fruits are maintaining high levels. Pineapples are in shorter supply and values have risen. Choice bananas are selling well at high values. Custard apples are in full supply. Prices dropped to 2s. 6d. per half-bushel, but returned to 3s. 6d. and 4s. during the last week of April. Early lines contained a high percentage of green fruit. This type of fruit often causes a drop in price during the early part of the season. Papaws are also being placed upon the market in a too green condition, making sales difficult. Apples are returning satisfactory prices. Some excellent lines of Stanthorpe Granny Smiths have been received and sold at satisfactory prices. On the other hand, good fruit has been spoiled by the inclusion of inferior grades. Mixed fruit will only realise the value of the poorest grade in the case.

Avocados are coming on to the market in increasing quantities. Many growers are sending this fruit when it is only half-matured. Nothing will ruin the development of the public taste for this fruit more quickly than following such a practice.

Prices for all fruits at the end of April were:—

TROPICAL FRUITS.

Bananas.

Brisbane.—Cavendish: Small, 5s. 9d. to 11s. 6d.; sixes, 9s. to 13s. 6d.; sevens, 9s. 6d. to 17s.; eights, 14s. to 17s.; nines, 16s.

Sydney.—Cavendish: Sixes, 16s. to 18s.; sevens, 18s. to 20s.; eights and nines, 20s. to 22s.

Melbourne.—Cavendish: Sixes, 14s. to 16s.; sevens, 16s. to 18s.; eights and nines, 18s. to 21s.

Pineapples.

Brisbane.—Smoothleaf, 4s. to 7s. per case, 1s. to 5s. per dozen; Ripley, 5s. to 8s. per case, 1s. to 4s. 6d. per dozen.

Sydney.—Smoothleaf, 7s. to 10s. per case.

Melbourne.—Smoothleaf, 10s. to 16s. per case.

Papaws.

Brisbane.—Yarwun, 6s. to 8s. tropical case; Gunalda, 4s. 6d. to 5s. bushel; Local, 2s. 6d. to 3s. 6d. bushel.

Sydney.—8s. to 12s. tropical case.

Melbourne.—14s. to 20s. tropical case.

Custard Apples.

Brisbane.—2s. 6d. to 4s. half-bushel.

Sydney.—2s. to 5s. half-bushel.

Melbourne.—7s. to 9s. half-bushel.

Monstera Deliciosa.

Brisbane.—3s. to 5s. per dozen.

Avocados.

Melbourne.—14s. to 16s. half-bushel.

Granadillas.

4s. 6d. to 6s. bushel case.

OTHER TROPICAL FRUITS.

Rosellas, 2s. 6d. to 3s. 6d. sugar bag.

CITRUS FRUITS.

Oranges.

Brisbane.—Commons, 4s. to 7s.; Navels, 6s. to 10s.; Specials higher.

Sydney.—Queensland Navels, 10s. to 15s.

Mandarins.

Brisbane.—Emperor, 10s. to 12s.; Fewtrell, 5s. to 10s.; Scarlet, 8s. to 10s.

Melbourne.—Fewtrell, 10s. to 12s.

Grapefruit.

Brisbane.—6s. to 8s. bushel.

Sydney.—8s. to 12s. bushel.

Melbourne.—10s. to 15s. bushel.

Lemons.

Brisbane.—Locals, 4s. to 7s.; Byrnestown and Gayndah, 8s. to 14s.; Specials higher.

Sydney.—Queensland, 10s. to 15s.

DECIDUOUS FRUITS.

Apples.

Brisbane.—Jonathan, 8s. to 12s.; Cleopatra, 8s. to 10s.; Granny Smith, 7s. to 12s.; French Crab, 8s. to 9s.

Sydney.—Granny Smith, 9s. to 11s.

Pears.

Brisbane.—B.D.C., 4s. to 7s.; Packhams, 8s. to 9s.; W. Cole, 9s. to 12s.; Kieffer, 5s. to 6s.; Howell, 6s. to 7s.

OTHER FRUITS.

Grapes.

Brisbane.—Walthams, 10s. to 12s.; Cervante, 7s. to 9s.; Purple Cornichon, 12s. to 14s.

Tomatoes.

Brisbane.—Ripe, 3s. to 6s.; Green, 2s. 6d. to 5s.; Coloured, 4s. to 8s

Sydney.—2s. to 4s. half-bushel.

Passion Fruit.

Brisbane.—Firsts, 10s. to 14s.; Seconds, 6s. to 8s.

Sydney.—10s. to 20s.

Melbourne.—14s. to 16s.

MISCELLANEOUS, VEGETABLES, &c.

Cucumbers.—*Brisbane*—3s. 6d. to 5s. bushel; *Sydney*—5s. to 7s. bushel.

Pumpkins.—5s. to 7s. bag.

Marrows.—1s. to 2s. dozen.

Lettuce.—1s. 6d. to 2s. 6d. dozen.

Cabbages.—4s. to 6s. chaff bag; Locals, 1s. to 6s. dozen.

Beans.—3s. to 4s. sugar bag.

Peas.—5s. to 6s. sugar bag.

Beetroot.—3d. to 1s. bundle.

Chokos.—3d. to 6d. dozen.

Sweet Potatoes.—3s. to 5s. sugar bag.

Carrots.—3d. to 6d. bundle.

Celery.—South Australian, 12s. to 16s. crate.

TO SUBSCRIBERS.

Subscribers to the Journal are asked to write their names legibly on their order forms. The best way is to print your surname and full christian names in block letters, so that there shall be no possibility of mistake.

When names are not written plainly it involves much tedious labour and loss of valuable time in checking electoral rolls, directories, and other references. This should be quite unnecessary.

Some subscribers write their surname only, and this lack of thought leads often to confusion, especially when there are other subscribers of the same surname in the same district.

Everything possible is done to ensure delivery of the Journal, and subscribers would help us greatly by observing the simple rule suggested, and thus reduce the risk of error in names and postal addresses to a minimum.

PRODUCTION RECORDING.

List of cows and heifers officially tested by Officers of the Department of Agriculture and Stock which have qualified for entry into the Advanced Register of the Herd Books of the Australian Illawarra Shorthorn Society, Jersey Cattle Society, and the Friesian Cattle Society, production charts for which were compiled during the month of March, 1939 (273 days unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
	AUSTRALIAN ILLAWARRA SHORTHORN.			
	MATURE COW (STANDARD 350 LB.).			
Valera Shiela	Sullivan Bros., Pittsworth	12,967·52	661·352	Loyalist Strathdhu
Happy Valley Barbara	R. R. Radel, Coalstoun Lakes	9,303·9	449·469	Molly's Hero of Glenthorn
Rosemount Fancy 19th	H. Seiler, Redbank Creek, Gatton	11,527·73	422·729	Rosemount Radiance
Happy Valley Belle's Molly	R. R. Radel, Coalstoun Lakes	11,623·75	404·46	Molly's Hero of Glenthorn
Cedargrove Venus 6th	P. D. Fiechtner, jnr., Pilton View, Greenmount	9,975·9	392·086	Duke of Cedargrove
Cedargrove Reddy 6th	P. D. Fiechtner, Pilton View, Greenmount	8,629·4	365·071	Duke of Cedargrove
	SENIOR, 4 YEARS (STANDARD 330 LB.).			
Tara Laura	Mrs. K. Henry, Watts Siding, Greenmount	10,315·5	409·499	Pansy's Gift of Murray's Bridge
	JUNIOR, 4 YEARS (STANDARD 310 LB.).			
Trevor Hill Lorna	Geo. Gwynne, Umbiram	7,370·89	332·351	North Glen Emblem
	SENIOR, 2 YEARS (STANDARD 250 LB.).			
Rhodesview Primrose 2nd	W. Gierke, and Sons, Helidon	10,042·89	405·768	Blacklands Prospector
Rhodesview Queenie 20th	W. Gierke and Sons, Helidon	8,773·03	323·081	Blacklands Prospector
Palmeto Fashion	Rex Tweed, Palmeto, Kandanga	7,379·85	320·644	Glengallan Major
Alfa Vale Gladys 3rd	J. E. Heath, Merlwood, Murgon	6,278·25	252·627	Reward of Fairfield
	JUNIOR, 2 YEARS (STANDARD 230 LB.).			
Ehlma Park Red Myrtle (257 days)	N. Bidstrup, Ehlma, Warra	8,488·63	338·707	Mount Blow Monarch
Navillus Nancy 3rd	C. O'Sullivan, Navillus, Ascot	7,855	331·041	Alfa Vale Re Nell
Alfa Vale Blossom 4th (255 days)	F. G. Lamkin, Kaimkillenbun	7,190·73	298·554	Reward of Fairfield
Jamberoo Ruth (256 days)	N. Bidstrup, Ehlma, Warra	6,413·19	264·362	Brooklyn Terrace Banker

	JERSEY.			
	MATURE COW (STANDARD 350 LB.).			
Glenview Miss Scott	F. P. Fowler and Son, Coalstoun Lakes	8,572·95	463·864	Trinity Officer
	JUNIOR, 3 YEARS (STANDARD 270 LB.).			
Trinity Syria	G. A. Champney, Wooroolin	8,376·05	401·678	Trinity Nobly Born
	SENIOR, 2 YEARS (STANDARD 250 LB.).			
Oak Park Ginger Lass	Miss J. Nowlan, Lindum	6,432·37	294·035	Brooklands Double Ginger
Sea Shell of Palm Ridges	J. Sigley, Millaa Millaa	4,397·95	258·412	Oceanview Merriamber Wait-a-while
	JUNIOR, 2 YEARS (STANDARD 230 LB.).			
Kathleigh Hetty	C. W. Barlow, Spring Creek, Toowoomba	5,750·5	312·857	Kathleigh Molly's King
Pineview Aster	J. Hunter and Sons, Borallon	5,359·06	307·23	Oxford Aster's Lad
College Milkmaid 2nd	Queensland Agricultural High School and College, Lawes	5,497·4	258·256	Earpart General Beau
Broadview Girlie	W. S. Kirby, Byrnestown	4,053·75	235·366	Glenview Mason
	FRIESIAN.			
	MATURE COW (STANDARD 350 LB.).			
Towerlton Anona	F. C. Noller, Kumbia	12,947·5	524·56	Domino Belted King

General Notes

Staff Changes and Appointments.

Mr. W. R. Winks, analyst, Agricultural Chemical Laboratory, Department of Agriculture and Stock, has been appointed also an analyst under *"The Veterinary Medicines Acts,* 1933 *to* 1938."

Mr. J. L. F. Foran, analyst in the Agricultural Chemical Lobaratory, has been appointed also an analyst under *"The Stock Foods Acts,* 1915 *to* 1935," and *"The Veterinary Medicines Acts,* 1933 *to* 1938."

The appointment of Mr. N. A. Anderson, Burrum, as an inspector under the Diseases in Plants Acts, has been cancelled, and Mr. J. Pedelty, loader for the Committee of Direction of Fruit Marketing at Burrum, has been appointed an inspector under the abovementioned Acts in his stead.

Mr. A. J. Unwin, Treasury Department, has been appointed Deputy for Mr. E. A. Crosser as a member of the Rural Development Board during the latter's absence on recreation leave.

Mr. C. Schindler, inspector, Diseases in Plants Acts, has been transferred from Warwick to Stanthorpe.

Messrs. N. J. McKavanagh (Bunya, via Aspley) and M. Johnson (Manager of Mount Sturgeon, Hughenden) have been appointed honorary protectors under the Fauna Protection Act.

Mr. H. Hallam, of Hayman Island, has been appointed an honorary protector under the Fauna Protection Act and an honorary ranger under the Native Plants Protection Act.

Pleystowe Mill Levy Committee.

Regulations have been issued under the Primary Producers' Organisation and Marketing Acts empowering the Pleystowe mill suppliers' committee to make a particular levy on suppliers of sugar-cane to the Pleystowe mill whose cane is loaded at Mirani West railway siding at the rate of 5s. per 100 tons, the proceeds from such levy to be used for the purpose of constructing a grid to assist in the delivery of sugar-cane to the Mirani West railway siding and for the prevention of straying cattle at the siding.

At least 50 per cent. of the suppliers of cane to the Pleystowe mill whose cane is loaded at Mirani West siding may, on or before 15th May next, petition the Minister for a poll on the question of the levy.

Dr. O. Kudelka, who for the past few months has been temporarily employed on investigational work at the Dairy Research Laboratory, Department of Agriculture and Stock, has been appointed bacteriologist, and will carry out investigational work for the Brisbane Milk Board.

Messrs. J. C. Butler and W. F. Benton, of Townsville, have been appointed honorary protectors under *"The Fauna Protection Act of* 1937" in respect of the recently proclaimed sanctuary for fauna at Paluma and Mount Spec. They also have been appointed honorary rangers under *"The Native Plants Protection Act of* 1930."

Mr. L. Healy, a patrolman of the Queensland Main Roads Commission employed on the Nerang-Beechmont road, has been appointed an honorary ranger under the Native Plants Protection Act.

Wild Life Preservation.

Executive Council approval has been given to the issue of an Order in Council under *"The Fauna Protection Act of* 1937," declaring the Bauple Sugar Mill Swamp and the Tiaro Swamp to be a sanctuary for the protection of fauna. Mr. A. G. Morris, manager of the Bauple Sugar Mill, has been appointed an honorary protector in connection with the sanctuary.

An Order in Council has been issued under *"The Fauna Protection Act of* 1937" declaring portion of the shire of Noosa to be a sanctuary for the protection of fauna. The sanctuary embraces the western part of the shire.

Fruit Marketing Regulations.

The Regulations in force under The Fruit Marketing Organisation Acts have been amended in certain particulars, principally with regard to the fees and allowances payable to members of the Committee of Direction of Fruit Marketing and sectional group committees; the qualifications of voters, and candidates for election to sectional group committees; and the method of counting votes at elections.

Citrus Levy.

The Citrus Levy Regulation, which has been in force for a number of years, and which empowers the Committee of Direction of Fruit Marketing to make a levy to be expended in the interests of the citrus industry of the State, has been reissued for a further period of twelve months. The levy is at the following rates:—

On all citrus sold or delivered, whether by rail, road, or boat to factories, at the rate of 5s. per ton.

On all citrus sold or delivered by rail to firms or persons other than factories, at the rate of 1s. 7d. per ton, with a minimum of one penny (1d.),

On all citrus sold or delivered otherwise than by rail to firms or persons other than factories at the rate of one halfpenny (½d.) per case, with a levy minimum of 1d.

An alteration in the levy issued this year provides that the amount of the levy shall be ½d. per case, instead of 1d. per bushel case, and ½d. per half-bushel case, as previously collected.

The Dairy Products Stabilisation Board.

An Order in Council has been issued under the Dairy Products Stabilisation Acts appointing Mr. C. W. Thiele (Bundaberg) to be a member of the Dairy Products Stabilisation Board to fill the vacancy caused by the death of Mr. R. M. Hill (Bororen).

Trespassing Pigs.

Proceedings under authority of the Queensland Pig Industry Act and which were successful recently in a Northern centre emphasise the importance of effective control of pigs. In the case referred to and in which a fairly heavy penalty was imposed, the owner of the pigs had permitted them to stray to an adjoining slaughter yard paddock where they had access to raw offal and blood. The trespass was an annoyance to the butcher who was endeavouring to observe regulations closely by keeping his yards in a tidy, sanitary condition. In this connection, it is of interest to note that legislative provision exists for the control of live stock and for the impounding of trespassing animals. As an illustration, in Queensland the remedy provided by the law against trespassing pigs is that the owner of property on which the animals are trespassing may take the trespassing animals to the nearest pound and deliver them to the pound-keeper to be impounded by him. Before he can release them, the owner of such animals must pay the cost of driving the animals to the pound, the pound-keeper's charges, and the prescribed rate of damage to the person on whose land the animals were found trespassing. If the owner does not pay these amounts the animals are sold by the pound-keeper.

Alternatively, if a trespassing animal does damage to property the owner of the property may sue the owner of the animal for the amount of damage done.

The proceedings referred to, however, were taken under Regulation No. 5 (2) of the Queensland Pig Industry Act which states: *Pigs shall not be allowed to trespass.*

Barley Board.

An Order in Council has been issued, under the Primary Producers' Organisation and Marketing Acts, amending the constitution of the Barley Board to provide that members of such Board shall hold office for a period of three years.

Messrs. E. Fitzgerald (Felton, Cambooya), P. D. Fiechtner, jun. (Greenmount), and the Acting Director of Marketing have been appointed members of the Barley Board from 24th April, 1939, to 23rd April, 1942.

Mr. J. A. Michelmore (Mackay) has been appointed millowners' representative on the Racecourse Local Sugar Cane Prices Board.

Open Season for Quail in Southern Queensland.

An Order in Council has received Executive approval to-day, providing, under "*The Fauna Protection Act of* 1937," an open season for quail (all species) in Southern Queensland from 1st May, 1939, to 31st August, 1939, both inclusive.

The area in respect to which the season will be opened is approximately that portion of the State south of the 25th parallel of south latitude.

The attention of shooters is drawn to an Order in Council which prescribes that twenty-five (25) quail is the maximum number which any one person may take during a period of twenty-four hours.

Answers to Correspondents

BOTANY.

Replies selected from the outgoing mail of Mr. W. D. Francis, Botanist.

Caustic Plant.

F. (Roma)—

The specimens belong to the caustic plant or bottle-tree caustic (*Euphorbia eremophila*). This is a very common plant in Western Queensland and on black soil plains. It has a milky juice like the other euphorbias. For a long time it has been accused of poisoning stock. So many reports of its poisonous character have been received from different parts of Western Queensland that it would appear highly probable that the plant is poisonous, but we have no experimental evidence to support this. Some time ago in New South Wales Professor Seddon fed this plant to sheep. The only result obtained was scouring.

Guinea Grass. Para Grass.

M.G. (Cooktown)—

1. Guinea Grass (*Panicum maximum*). This is the grass with the large seed-head.
2. Para Grass or giant couch (*Brachiaria mutica*).

Both are good grasses and stock are fond of them. Several varieties of Guinea grass have been introduced in recent years by the Department of Agriculture and Stock, and some of them seem rather better than the ordinary type. A particularly good one is that known as ''green panic'' (var. *trichoglume*).

The typical form of Guinea grass is a very palatable and valuable grass, particularly for periodical cutting and feeding-off. Para grass is well known in Queensland as *Panicum muticum*. It does well under cultivated conditions, but prefers a rather moist climate; in dry areas it is confined to the edges of creeks and billabongs. It is very frost-tender.

The shrub or small tree specimen has no common name. Its botanical name is *Breynia cernua*. It is not often eaten by stock, which suggests that it is unpalatable. It is not known to be poisonous.

Satinwood or Lignum-vitae.

R.C. (Raglan)—

The specimen is a very common coastal rain-forest tree, commonly called satinwood or lignum-vitae. Its botanical name is *Vitex lignum-vitae*. The wood of this tree is fairly durable, and where better timbers—such as the hardwoods, white beech and crow's ash—are not available, it is sometimes used as fencing posts. No parts of the tree are known to be poisonous. The berries, however, are so rarely eaten that they appear to be at least unpalatable.

Rattlepod.

W.J.L. (Kingaroy)—

The specimen is a native leguminous plant, *Crotalaria Mitchellii*. It is one of the plants commonly known as ''rattlepod'' because of the seeds becoming loose in the pods and the plant, when shaken, rattles. Rattlepods are very rarely eaten by stock, which suggests unpalatability. One species (*Crotalaria striata*) is poisonous to stock.

A Reputedly Good Sheep Fodder.

J.J.S. (Ilfracombe)—

Your specimen is one of the sensitive plants, *Neptunia gracilis*. It is a native leguminous plant. The late Stock Inspector McCarthy, when he was stationed at Hughenden, reported that this plant was regarded in the Hughenden district as a good sheep fodder.

"Wild Verbena." Mexican Clover.

H.McB. (Millmerran)—The specimens are:—

1. *Heliotropium anchusaefolium*, Wild Heliotrope, ''wild verbena'' of the Warwick district.
2. *Richardsonia braziliensis* (*R. scabra*), Mexican Clover.

Neither is known to be poisonous to stock. In America, Mexican clover has apparently a good reputation as a fodder plant, but stock do not appear to be very fond of it here. It is a very serious weed in some places, especially in pineapple plantations, and in such situations it is difficult to get rid of. The wild heliotrope is a very bad weed in the Warwick district.

Rag Weed.

A.L.P. (Kingaroy)—

The specimen is rag weed or Canada fleabane, *Erigeron canadensis*. This weed has been spreading in some of our coastal districts for some time. It is not injurious to stock. It is an annual or short-lived plant, and you may find it to be less prevalent in two or three years' time.

Bitter Bark. Chain Fruit. "Kangaroo Apple."

R.D.C. (Murgon)—

Your specimens (submitted by a Kingaroy farmer) have been determined as under—

1. *Alstonia constricta* var. *villosa*, bitter bark.
2. *Alyxia ruscifolia*, chain fruit.
3. *Solanum aviculare*, kangaroo apple.

Nos. 1 and 3 are rarely eaten by stock. Bitter bark contains alkaloids somewhat similar in action to quinine. However, it has not been shown to be poisonous. No. 3 was experimented with in New South Wales by Professor Seddon. In one of the experiments one calf died, but in subsequent feeding trials no deaths occurred. This indicates that evidence of its poisonous character was not confirmed.

THE IMPORTANCE OF MINERALS IN THE MAINTENANCE OF ANIMAL HEALTH.

A few years ago, a New Zealand specialist in animal husbandry was sent to report on farming conditions in the Falkland Islands for the British Government, and he found that imported horses had been reduced to the height of ponies in three genrations, and that both sheep and cattle devoured bones of dead animals, even before the carcases had properly rotted. This visit to the island group at the ''toe'' of South America was made before the days when the effect of mineral deficiency in pastures was generally appreciated and when comparatively little had been published on the subject. It also was found that grown-up sheep did not thrive in the Falklands, and that the stunted cattle weighed only 500 lb. as fats. Moreover, all the animals on the islands had beaten tracks from the high country to the beaches in search of seaweed and every washed-up oddment. By what we know now, the reason for all that is plain. For forty years stock had been reared and exported from the Falkland Islands, and no attempt had been made to return essential elements to the soil. The deficiency disease in all classes of stock on the islands was the result of insufficient minerals.

The feeding of mineral licks, top-dressing of pastures with lime and phosphatic fertilizers, and drenches and special feeds were among the special measures recommended to combat what was later shown to be a deficiency in the soil of bone-forming elements. And they proved effective. Farm animals increased in size and stock losses were reduced to a normal degree.

In Australia and New Zealand, as well as in other stock-raising countries, the supply mineral licks to stock in districts in which there is a deficiency of essential elements for the full development of animal life is now an established practice. Farming is truly becoming a scientific business!

Rural Topics

Blood Meal Feeding to Dairy Stock.

Blood meal feeding to dairy cattle presents little difficulty when the meal is fresh and free from objectionable odour. It may be incorporated in the regular feed or mixed with appetising foods such as maizemeal, bran, pollard, cottonseed. Care must be exercised, however, to see that the feed box is kept clean.

In the presence of moisture, blood soon fouls and an objectionable smell results from the fermentation. Stock dislike this intensely and considerable difficulty may be experienced in getting animals into the bail where such food has lain.

The Penalty of Neglect.

Neglect to give well-timed attention to some essential item in the care of livestock or production of crops may offset much of the intelligent effort of previous weeks or months. For instance, well-bred sows may receive the best of attention and food during their ''in-pig'' period, only to lose some of their litters because they were not in the farrowing pen or because the young pigs had not been protected against a sudden drop in temperature. Similar experiences happen with other stock. Some farmers' so-called ''good luck'' is their knack of looking after essential details in good time, and of noting early symptoms of some condition before it has developed to a serious degree.—*New Zealand Farmer.*

Stud Pig Sales.

Last year no fewer than 612 official transfers were registered in Queensland. Particulars:—

Breed.	Registration.	Litter Records.	Transfers.
Berkshire	122	139	136
Middle Whites	43	30	30
Tamworths	117	110	184
Large Whites	50	55	119
Wessex	62	71	135
Others	16	8	8
Totals	410	413	612

In the December carcase competitions conducted by the Australian Meat Board, the Kingston Pig Farm Co. was awarded second prize in the baconer class and third prize in the porker class. O. F. Haack, of Beenleigh, was awarded first and second in the porker class.

Self-expression through Drama.

A feature of the Caragabal Conference of the Agricultural Bureau of New South Wales was the staging of several dramatic entertainments by the girls of the Leadership Camp of the Bureau, and by members of the Ooma branch. This is a new departure for Bureau members, and a very valuable one indeed.

For young people particularly, a recreational programme which demands a contribution by more than one member, carried out in the form of dramatic effort, is a great aid to self expression, which is necessary if Bureau members are to make their voices heard in the community.

In addition, of course, the entertainment value of such dramatic work is very real, and provides welcome relaxation from the more serious aspects of a conference or branch programme.—*The Agricultural Bureau Record,* New South Wales Department of Agriculture.

Educating the Farmer.

As a result of preaching better farming methods, the north-western wheat region of New South Wales has produced a record harvest. There, the old days of ''hit or miss'' have gone forever, so far as wheat growing is concerned; droughts have lost their sting, although many problems still remain to be solved. The point is that education cannot stand still, and if it were not for the application of proved methods of cultivation, that record harvest under harsh climatic conditions could not have been bagged.

Farm Notes

JUNE.

THE wheat sowing season normally extends from April to July, with the main Darling Downs sowing being effected during June. Well-prepared fallows should contain sufficient moisture to permit of sowings after light showers only, but on recently ploughed lands it will be necessary to await substantial rains or to commence sowing dry when the surface soil has dried out sufficiently to avoid the malting of grain. Farmers unfamiliar with the various varieties of wheat should remember that in general, early-maturing varieties should be sown late, and slow-maturing varieties sown early.

Of the varieties in general cultivation at present, Florence, Novo, and Seaspray are early maturing, while Currawa and Cleveland are slow maturing.

All others are classified as medium, early, or mid-season, with little difference in the number of days taken to mature under identical conditions.

All seed wheat should be treated for the prevention of ball smut, using copper carbonate or either of the mercury dusts ''Agrosan'' or ''Ceresan.''

Where dry conditions have prevented the earlier seasonal sowings of oats, barley, wheat, field peas, &c., there is still time to profit by so doing, choosing early-maturing varieties which will make satisfactory growth before the normal warm, dry spring conditions eventuate.

With all fodder crops utilised for grazing, greater value is obtained from a number of small paddocks which can be fed off in rotation.

Land intended for maize should now be ploughed to a depth of at least 9 inches, and allowed to lie in the rough until early spring, the action of frost and rain having a mellowing effect on the soil.

Paddocks set aside for the July and August planting of potatoes should also receive attention, as the adequate preparation of land is one of the most important factors in the satisfactory growth of all crops.

Farmers desirous of destroying useless green timber or undergrowth with the aid of arsenic pentoxide are reminded that the April to July period is probably the most effective time for carrying out this work. Frill ringing and poisoning of trees with a 20 per cent. solution of arsenic pentoxide has proved very satisfactory, combined with the felling and swabbing of butts in regard to suckers and undergrowth. Shelter belts and shade trees should always be reserved when planning poisoning or ringbarking operations.

The winter months generally prove the best time to undertake the laborious work of ringbarking, clearing, fencing, roadmaking, &c., as much less effort is required than during the heat of summer.

Recently harvested maize grain should be allowed to dry out thoroughly before being shelled, otherwise heating is likely to occur in the bags.

Grain not required for immediate use or sale can be stored indefinitely at no great cost other than the initial purchase of tanks and occasional fumigation to destroy weevils.

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THE MACHINE ON THE FARM.

Tractors and improved implements enables the producer to make the most of timely rain, and a great increase in the use of machinery on the land is proof that he is awake to the benefits to be obtained from a propitious season by using suitable modern machines to do the seasonal work quickly, thoroughly, and with the minimum of time, labour, and expense.

It is sound practice to make the best of a good season by building up reserves of fodder against the next dry season; the right kind of machinery enables this to be done.

Orchard Notes

JUNE.

THE COASTAL DISTRICTS.

IF the weather is dry, citrus orchards should be kept in a good state of tilth and any winter green manure crops turned under. Old worn-out trees may be dug out and burnt. Custard apples will be ripening more slowly as the nights get colder. If the weather becomes unduly cold, or if immature fruit is sent South, the fruit is apt to turn black and become valueless. Grade custard apples carefully, and pack in cases holding a single layer of fruit only for the Southern markets.

The pineapple plantation should be shallow worked and kept free from weeds. The fruit takes longer to mature at this time of the year; consequently it can be allowed to remain on the plant until partly coloured before gathering for the Southern markets.

Banana plantations also should be kept worked and free from weeds, especially if the weather is dry, as a severe check to the plants now may mean small fruit later on. Bananas should be allowed to become full before the fruit is cut. The necessity of proper handling, grading, and packing of the fruit should be kept in mind. Land intended for planting with bananas or pineapples during the spring should be prepared now.

Strawberries require constant attention, and unless there is a regular and abundant rainfall, they should be watered regularly. Where not already done, vineyards should be cleaned up ready for pruning. It is, however, too early to prune or to plant out new vineyards.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

ALL kinds of deciduous fruit trees are now ready for pruning, and this is the principal work of the month in the orchards of the Granite Belt area. Thin out young trees properly, and cut them back hard. Many good trees are spoilt by insufficient or wrong pruning during the first three years. If in doubt as to the correct method of pruning consult the district instructor in fruit culture. In old orchards, do not have too much bearing wood; cut out severely, especially in the case of peaches. Planting may be commenced where the land is ready as early-planted trees become well established before spring, and thus get a good start. When land is intended for planting this season, see that it is well prepared and well sweetened before the trees are put in, as young trees seldom make a good start when planted in sour or badly prepared land.

Slowly acting manures—such as bonedust, meatworks manure, or phosphates—may be applied now, as they are not liable to be washed out of the soil, and they will be available for the use of the trees when they start growth in spring. Lime may also be applied where required. Badly drained land should be attended to, as no fruit trees will thrive with stagnant water lying round their roots.

On the Downs and Tableland all kinds of fruit trees may be pruned now, and vines also may be pruned in any district where there is no risk of late frosts. Prunings should be gathered and burnt, and the vineyards ploughed up and well worked to reduce the soil to a good state of tilth, so that should rain come it will absorb all that falls and the moisture can be kept in the soil by cultivation subsequently.

Citrus fruits will be at their best in the western districts. The trees should be watered if they show signs of distress; otherwise all that is necessary is to keep the surface of the land well worked. All main-crop lemons should have been picked by this time.

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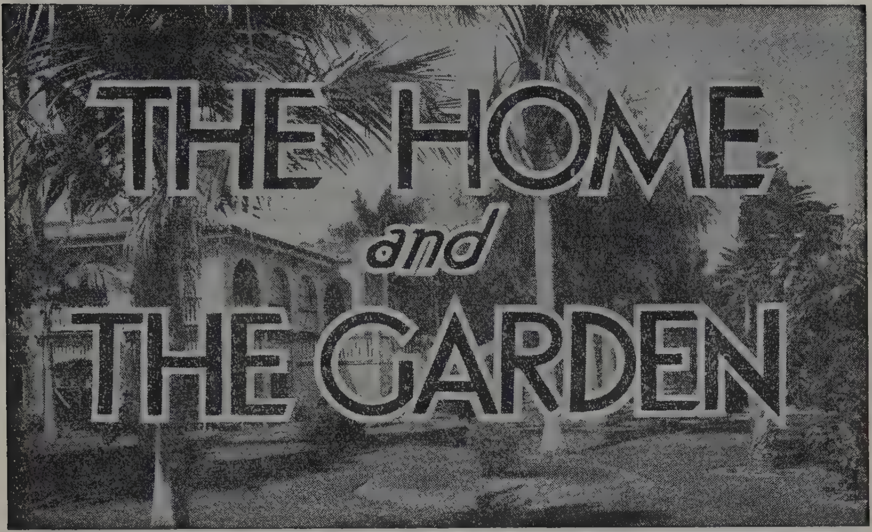
FALLOWING.

Fallowing ensures that the crop can be sown at the right time, conserves moisture in the soil by trapping every rain drop, destroys harmful and other weeds, destroys the spores of plant diseases, increases the amount of available plant food, sweetens soil and puts it in the condition of promoting vigorous plant growth.



Our Babies.

Under this heading a series of short articles, by the Medical and Nursing Staffs of the Queensland Baby Clinics, dealing with the care and general welfare of babies has been planned in the hope of maintaining their health, increasing their happiness, and decreasing the number of avoidable deaths.

HEALTHY, HAPPY BABYHOOD.

Baby's Play.

One of the greatest joys of life is the joy of movement, the joy of action. A baby's little life may be said to be made up of a mass of impulses seeking outlets in various directions, and his greatest happiness comes from satisfying these impulses.

The young baby sleeps most of the time. He is not very old before he becomes very active with his mouth and with his vocal organs. Shortly afterwards his eyes, legs, and arms are the seat of almost perpetual motion while he is awake. These activities correspond to the growth and development of his brain and muscles. Soon it becomes necessary for the parents to provide facilities for the regular exercise of his little body. By the time he is six weeks old he should be given an opportunity of lying in a suitable part of the house unhampered by unnecessary clothing for certain periods of the day in order to allow his limbs and body to move freely.

Kicking exercise is the baby's first play. From it he derives numerous sensations which give him pleasure. Later this leads to the discovery of his first and best playthings—his own fingers and toes—best because, in addition to their fascinating habit of unexpectedly appearing and disappearing, he derives twofold pleasure from playing with them, that of touching and of being touched.

Then he comes into the realm of playthings apart from himself. Every object within his reach is a potential plaything, and life consists of one great game—the adventure of satisfying curiosity. This sort of play is utterly satisfying to the unspoilt child. Baby can play at his own will. When he is tired he can stop. If he goes on a little too long Nature steps in and he sleeps till his nervous energy is restored. His developing faculties are stimulated without the slightest danger of over-fatigue of the delicate nervous system.

How different is the situation when baby is played with incessantly whenever he is awake. Stimulation is applied in our time at our pace, and the inevitable result is over-stimulation and over-fatigue, unless the process is kept within strict limits. Just watch a baby responding to prolonged playing of this kind. The eager, responsive type of child quickly reacts, and his chuckling charms us. A little of this may do no harm, but the first signs of fretfulness or wandering attention are signs of fatigue and should be the signal to stop.

Imagine our feelings if a creature of ten times our size and mental capacity insisted on prolonging certain diverting antics beyond our power of spontaneous response! It does not require much effort of the imagination to see that this sort of thing carried to excess may wreck the nervous system. The truth is that many play with babies for their own amusement and not for the baby's pleasure.

We do not mean that baby should receive no attention. Every baby and little child needs proper handling and nursing given by a loving mother and father. A neglected baby grows into a flabby, listless child. But remember that injudicious playing with young babies and toddlers makes them irritable and fretful and disturbs their sleep, rest, and digestion. The one period when a baby should never be played with is immediately after food. Troublesome digestive disturbances may be due to this cause alone and may require prolonged treatment to cure.

Let play be of short duration, not boisterous, and not before a whole gallery of spectators, and, above all, let the little baby learn to play by himself.

You may obtain information on all matters concerning child welfare by visiting the nearest Baby Clinic, or by writing to the Sister in Charge, or by communicating direct with the Baby Clinic Training Centre, Alfred street, Valley, N. 1, Brisbane.

THE CARE OF MILK IN THE HOME.

The keeping quality or ''life'' of milk is dependent primarily on the care exercised in its production and handling on the farm. The neglect on the part of the householder to observe certain precautions, however, may seriously impair its keeping quality, consequently the milkman is blamed for what should really be the responsibility of the customer.

Every utensil into which milk is put adds its quota of germ life to the milk. It cannot, therefore, be expected that milk, even if produced under careful conditions and thus having a low bacterial count, will keep well if it is subsequently treated carelessly in the consumer's home. The consumer must accept his share in ensuring that this most valuable food is kept as pure as possible. In the home, the prevention of the introduction and growth of germs in milk depends chiefly on the cleanliness of the jugs or other vessels in which it is contained and the temperature at which it is held.

The cleaning of any vessel which is intended for milk requires a slight modification of the usual procedure in washing dishes and pots and other household articles. The following instructions should be observed:—

1. Rinse with cold water.
2. Wash in hot water or hot water to which washing soda has been added.
3. Scald with boiling water.
4. Invert to dry. Cloths should never be used for drying as they simply reintroduce numerous germs which, if favourable conditions exist, will multiply extensively in and reduce greatly the period of sweetness of milk placed in the vessel afterwards.

Any milk vessel cleaned in the way described will add very few additional bacteria to those already present in the milk on its delivery, whereas a neglected or carelessly washed container might add countless numbers. The influence of an improperly cleaned vessel in reducing the "life" of milk will be appreciated readily if it is remembered that bacteria double in number every twenty to thirty minutes at ordinary temperatures. Their multiplication is markedly restrained at lower temperatures until below 50 deg. Fahr., when it is practically suspended. The object in keeping milk as cool as possible in the home is, therefore, evident.

To preserve the freshness of milk in the home, the chief things to be done are:—

1. Use only vessels free from cracks and chips and cleansed scrupulously in the way already described. Plain vessels are preferable to those of fancy design, because of the greater ease in cleaning them.
2. Keep the milk in a cool, clean place.
3. Always cover the milk jug to exclude insects, particularly flies, as they, especially, transport numerous objectionable bacteria.
4. Since milk fat readily absorbs odours from its surroundings, milk should be kept apart from any substance possessing a penetrating odour, onions, certain fruits—such as pineapple —meats, and fish in any form.
5. Remove the jug from the doorstep, or wherever it is placed, as soon as possible. See that the milk is protected from the sun, preferably in a cool, dark place.

IN THE FARM KITCHEN.

CALLING ALL COOKS!

(Supplied by the Queensland Nutrition Council.)

Like the old grey mare, cooking, modern style, "ain't what it used to be." The cook stove is no longer the only device used in food preparation, and bakedays are losing their terrors.

The cookstove is now only one of a team of food service implements. Of equal status is the refrigerator, the fruit juice extractor, the rotary food grater. But more important than this is the extent of commercial food preparation and conservation such as the pasteurising plant and commercial refrigerator.

The kitchen need no longer be the hot spot it used to be, and permanent waves are replacing the permanent backaches and wispy hair that used to come from long hours spent over a hot stove.

The idea of the kitchen is changing to the conception of a food preparation laboratory.

A good story is told of a Digger who was paraded before the Commanding Officer for using ''language'' in the camp kitchen. In his defence, he made it clear that he had not called the cook a ——; he merely asked who had called the —— a cook!

But under modern conditions it might not be necessary to call anyone a cook. It is rather difficult to know what word to use in its place, but a word meaning ''a preparer and server of food'' would serve the purpose better. Perhaps the word ''culinaire'' with its French fragrance might be considered.

When the history of cooking and food preparation in Australia comes to be written, the first stage to be chronicled will be that of corn beef and damper.

This was a necessary accompaniment of pioneering period of Australia's development with its household handicaps. Some Australians are still in that stage, in spite of the removal of these handicaps.

Then came the sponge cake period, when no woman worthy of the name dared face her friends unless she could produce a sponge cake 6 inches high, crowned with icing and stuffed with rich filling.

How the festive afternoon-tea table groaned with such confections! Washed down with well-sweetened tea the ladies lulled themselves into a false feeling of nutritional security. Not so bad if indulged in occasionally, but definitely figure-deforming if made a common practice.

While this habit was bad enough for grown ups, it was verging on the criminal for children, whose needs we now know are for the foundation foods if virility is to be built up.

With this period went the white bread, the arrowroot biscuit, and the starchy milk pudding.

While Australian culinary habits have little of distinction to recommend them, one of the chief aspects that will receive comment by chroniclers will be the non-use of Australia's natural nutritional wealth.

Milk there is in abundance. We have a milky munificence that has no parallel in any other country.

Queensland produces three quarts of milk per day per head—and 85 per cent. of it is separated and the skim milk, rich in first-class protein and lime, is fed to stock or otherwise wasted as far as human nutrition is concerned!

And the fruit!

Queensland has the temperate fruitgrowing zones of the Granite Belt and the tablelands to draw on. The coastal areas with their tomatoes and other vegetables, and the tropical pineapples, mangoes, bananas, and papaws.

Production is so prolific, thanks to modern methods of agriculture, that one glut succeeds another almost all the year round.

And yet with all this natural bounty at our very doorstep the demand for refined civilised foods is such that Queenslanders eat over half a pound of white flour per head per day.

The use of white flour and the non-use of the more nutritionally valuable germinal part of the wheat and the outer coverings of the wheat berry, result in a deficiency of the vitamin B—now recognised to be one of the most widespread of the vitamin deficiencies of civilised diets.

The ''good cook'' of the future would be more accurately described as the ''good preparer of meals.''

She will earn her reputation not by the fact that she can bake a sponge cake 6 inches high, including a rich and creamy filling, but by the fact that she can set before her family an attractively balanced meal rich in food value and a masterpiece in palatability.

And instead of spending her artistic energy on the complex decoration of an already too-sweet cake, she will use it to devise attractive colour combinations and nutritious dishes which the large variety of fruits and salad vegetables available to every Queensland housewife makes possible.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF MARCH IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING 1939 AND 1938, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Mar.	No. of years' records.	Mar., 1939.	Mar., 1938.
North Coast.	In.		In.	In.
Atherton	8·53	38	19·79	1·46
Cairns	17·81	57	27·81	3·61
Cardwell	15·65	67	20·95	1·39
Cooktown ..	15·09	63	25·51	2·07
Herberton ..	7·60	53	21·65	0·65
Ingham	15·86	47	27·55	5·77
Innisfail	26·46	58	40·42	11·10
Mossman Mill ..	17·49	26	35·43	0·97
Townsville ..	7·11	68	5·56	1·64
Central Coast.				
Ayr	6·39	52	5·31	1·90
Bowen	5·82	68	3·53	8·22
Charters Towers ..	3·76	57	2·94	4·20
Mackay P.O. ..	12·18	68	14·08	20·06
Mackay Sugar Experiment Station	11·26	42	10·34	17·82
Proserpine ..	12·55	36	9·82	13·97
St. Lawrence ..	5·28	68	4·83	11·26
South Coast.				
Biggenden ..	4·01	40	3·12	6·76
Bundaberg ..	5·24	56	8·40	8·61
Brisbane	5·60	87	15·72	4·24
Caboolture ..	7·51	52	18·79	8·98
Childers	4·74	44	9·00	8·79
Crohamhurst ..	11·00	46	18·50	10·89
Esk	4·67	52	6·90	4·72
South Coast—contd.	In.		In.	In.
Gatton College ..	3·03	40	..	2·30
Gayndah	3·01	68	4·08	4·05
Gympie	6·18	69	7·32	5·87
Kilkivan	3·85	60	4·00	3·57
Maryborough ..	5·91	68	9·19	8·72
Nambour	9·32	43	18·36	12·32
Nanango	3·36	57	2·87	4·60
Rockhampton ..	4·42	68	8·31	8·83
Woodford ..	7·73	52	11·25	9·00
Central Highlands.				
Clermont ..	3·06	68	2·75	2·10
Gindie	2·58	40	..	2·49
Springsure ..	2·91	70	4·76	4·75
Darling Downs.				
Dalby	2·69	69	4·58	3·94
Emu Vale ..	2·27	43	7·28	2·20
Hermitage ..	2·08	33	..	2·73
Jimbour	2·55	51	2·91	5·73
Miles	2·68	54	3·80	2·24
Stanthorpe ..	2·59	66	5·08	0·71
Toowoomba ..	3·72	67	7·14	3·89
Warwick	2·45	74	8·61	0·66
Maranoa.				
Bungeworgorai ..	1·78	25	..	0·63
Roma	2·62	65	6·62	1·28

A. S. RICHARDS, Divisional Meteorologist.

CLIMATOLOGICAL TABLE—MARCH, 1939.

COMPILED FROM TELEGRAPHIC REPORTS.

Districts and Stations.	Mean Atmospheric Pressure, at 9 a.m.	Shade Temperature.						Rainfall.	
		Means.		Extremes.					
		Max.	Min.	Max.	Date.	Min.	Date.	Total.	Wet Days.
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	29·74	87	74	95	5	70	29 to 31	2,551	24
Herberton	..	78	64	89	5	58	14	2,165	19
Rockhampton	29·86	86	70	99	5, 6	67	23, 27, 30, 31	831	18
Brisbane	29·94	81	68	97	6	59	25	1,572	21
Darling Downs.									
Dalby	29·94	83	63	95	6	53	25, 27	458	11
Stanthorpe	..	76	58	90	6	43	25	508	16
Toowoomba	..	77	61	93	6	51	25	714	16
Mid-Interior.									
Georgetown	29·78	90	72	95	10, 14	66	31	432	9
Longreach	29·82	95	71	105	7	65	28	37	4
Mitchell	29·90	86	65	100	7	53	26	164	7
Western.									
Burketown	29·76	91	75	98	10, 13, 18	69	24, 26	516	10
Boulia	29·82	93	71	101	12	62	1	79	6
Thargomindah ..	29·86	90	68	96	6	58	26, 27	112	5

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	May, 1939.		June. 1939.		MOONRISE. May., 1939.	MOONRISE. June. 1939.
	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					p.m.	p.m.
1	6·18	5·20	6·36	5·3	3·36	4·28
2	6·18	5·19	6·36	5·3	4·17	5·16
3	6·19	5·19	6·37	5·3	5·1	6·8
4	6·19	5·18	6·37	5·3	5·47	7·0
5	6·20	5·17	6·38	5·3	6·35	7·55
6	6·21	5·17	6·38	5·3	7·26	8·48
7	6·21	5·16	6·39	5·3	8·18	9·39
8	6·22	5·15	6·39	5·3	9·10	10·32
9	6·22	5·14	6·40	5·2	10·2	11·20
10	6·23	5·14	6·40	5·2	10·55	a.m.
11	6·23	5·13	6·40	5·2	11·44	12·15
12	6·24	5·12	6·41	5·2	..	1·6
					a.m.	
13	6·25	5·12	6·41	5·2	12·38	1·57
14	6·25	5·11	6·41	5·2	1·29	2·46
15	6·26	5·10	6·42	5·2	2·20	3·52
16	6·26	5·10	6·42	5·2	3·15	4·53
17	6·27	5·9	6·42	5·3	4·12	5·51
18	6·28	5·9	6·42	5·3	5·8	6·52
19	6·28	5·8	6·43	5·3	6·8	7·52
20	6·29	5·8	6·43	5·3	7·8	8·42
21	6·30	5·7	6·43	5·3	8·9	9·31
22	6·30	5·7	6·43	5·3	9·7	10·14
23	6·31	5·6	6·44	5·4	9·58	10·55
24	6·32	5·6	6·44	5·4	10·48	11·36
						p.m.
25	6·32	5·6	6·44	5·4	11·32	12·16
					p.m.	
26	6·33	5·5	6·44	5·5	12·15	12·57
27	6·33	5·5	6·44	5·5	12·57	1·39
28	6·34	5·5	6·45	5·5	1·35	2·24
29	6·35	5·4	6·45	5·6	2·16	3·12
30	6·35	5·4	6·45	5·6	2·57	4·3
31	6·36	5.3			3·42	

Phases of the Moon, Occultations, &c.

4th May	○	Full Moon	1 15 a.m.
11th „	☾	Last Quarter	8 40 p.m.
19th „	●	New Moon	2 25 p.m.
26th „	☽	First Quarter	9 20 a.m.

Perigee, 23rd May, at 10.0 p.m.
Apogee, 11th May, at 3.0 p.m.

Given a clear morning sky and a free eastern horizon on the 16th, about an hour before sunrise Venus and Saturn rising at nearly the same time about 4 o'clock would be seen well up; Mercury nearest the horizon and Jupiter nearly halfway to the meridian. All are still in Pisces, but Mercury hard on the border of Aries. In daylight, at 7 a.m., Venus and Saturn will be separated by only half a degree. At the same time both these planets will be in conjunction with the Moon, three days before New.

On the 17th Mercury and the Moon will meet at midnight, below the horizon.

Mars in Sagittarius, the only planet visible in the evening sky, will not be well seen until Scorpio is high above the horizon in the south-east. Neptune, the invisible, is among the small stars of Leo, near Virgo. Pluto in Gemini has not yet been admitted in Astronomical Year-books as an accredited member of the Sun's retinue.

Mercury rises at 4.15 a.m., 2 hours 3 minutes before the Sun, and sets at 4.9 p.m., 1 hour 11 minutes before it, on the 1st; on the 15th it rises at 4.41 a.m., 1 hour 45 minutes before the Sun, and sets at 4.3 p.m., 1 hour 7 minutes before it.

Venus rises at 3.46 a.m., 2 hours 32 minutes before the Sun, and sets at 3.46 p.m., 1 hour 34 minutes before it, on the 1st; on the 15th it rises at 4.7 a.m., 2 hours 19 minutes before the Sun, and sets at 3.39 p.m., 1 hour 31 minutes before it.

Mars rises at 9.58 p.m., and sets at 11.44 a.m., on the 1st; on the 15th it rises at 9.30 p.m., and sets at 11.10 a.m.

Jupiter rises at 3.7 a.m., and sets at 3.21 p.m., on the 1st; on the 15th it rises at 2.24 a.m., and sets at 2.32 p.m.

Saturn rises at 5.3 a.m., and sets at 4.37 a.m., on the 1st; on the 15th it rises at 4.14 a.m., and sets at 3.46 p.m.

In this month, when the great Orion leaves our evening sky, the finest southern constellations, Scorpio, Centaurus, and Argo Navis, have arisen in the south-east.

2nd June	○	Full Moon	1 11 p.m.
10th „	☾	Last Quarter	2 7 p.m.
17th „	●	New Moon	11 37 p.m.
24th „	☽	First Quarter	2 35 p.m.

Apogee, 8th June, at 9.0 a.m.
Perigee, 20th June, at 6.0 a.m.

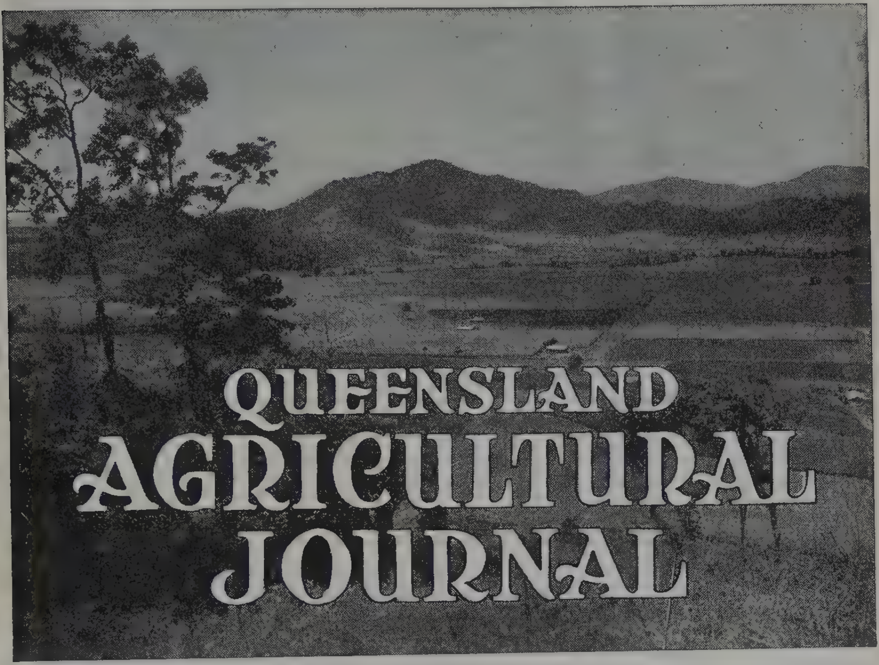
For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S. add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

ANNUAL RATES OF SUBSCRIPTION.—Farmers, Graziers, Horticulturists, and Schools of Arts, **One Shilling,** members of Agricultural Societies, **Five Shillings,** including postage. General Public, **Ten Shillings,** including postage.



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Event and Comment

Education in a Changing World.

"TO-DAY democracy is challenged; to-day is the day of readjustment and realignment; we must think more of the future and less of the past, except, perhaps, to profit by the lessons of the past. More than ever is the future to the young. The future of democracy rests mainly with them, and the maintaining of democracy will call for an even higher standard of citizenship than in the past. An education system is basically for the young. Besides providing adequately for high standards of education and physical fitness the system should inculcate those lofty ideals of citizenship which will encourage youth to aim at holding and developing the country which is its heritage." With those words the Premier of Queensland, Hon. W. Forgan Smith, LL.D., prefaced a recent thought-stimulating address. Continuing, he remarked that it had been said aptly that the nation which had courageous and forward-looking leaders who, in the midst of the present world crisis, dared to provide, encourage, foster, and improve education—and especially education for leadership—would be the nation that would write the history of the next generation.

A comprehensive system of national education, flexible enough to meet the expanding requirements of a growing State, had always had a strong appeal for the Queensland citizen. He felt, also, that under a genuine democracy the humanities, and the social services generally, should expand in consonance with higher standards of living.

Out of intensive reflection on matters governmental, induced by the acute conditions of turbulent times, arose the thought, amongst other thoughts, as to whether our existing system of national education might not need a little adjustment and expansion to enable its administrators to cope successfully with recent developments and expanding requirements.

In giving expression to some thoughts which had occurred to him, he spoke as one who, during his whole lifetime, had been an earnest seeker after truth and knowledge, which alone brought about understanding. "Most of the evil in life is due to ignorance," he remarked, "and the greatest menace to society is stupidity. It is the aim of education to eliminate ignorance and stupidity, and so set the people free."

As one who had had to foot the rugged road of hard work and who could only dream of the primrose path of ease; as one who had toiled and moiled with the worker, he might claim to know something of the world of work and to be able to sense changing views which emerged from changing conditions industrially and otherwise. Then, in a long period of Ministership and Premiership one naturally got to know much of mankind and of things. One acquired a ripe knowledge of the land and its requirements. And more and more, as wisdom grew, one saw the necessity for a national system of education which was suited to the needs of the pupil and the student of to-day and to-morrow, and felt the necessity for never-ceasing watchfulness in the making of adjustments to meet changing conditions. Care must be taken, however, that readjustment did not cause restriction, but that the system was kept broad-based and tolerant, so as to assist materially in keeping a democratic country democratic. Music, painting, sculpture, poetry, drama, general literature should be fostered. As he had indicated, however, his concern at the moment was with the practical side of education rather than with the highly cultural, although the practical and the cultural should never be divorced.

In a land of bread-winners people must work in order to live; the worker should be a good worker, whatever his calling, but to be a good worker he should be trained properly; the preparatory training, at least, should be given in the schools. He thought that with those simple principles most citizens would agree. Then came the inquiry as to whether the facilities provided by the State were sufficient to enable that training to be given adequately. One thought of all the unskilled workers on the labour market and wondered whether an expansion of the vocational section of the system might tend in time to reduce the numbers of the wholly unskilled. Still pondering, the thought ran through his mind as to whether suitable courses could be evolved which would be sufficiently useful and attractive to hold at school for a longer period a substantial number of those 10,000 age-fourteen children who leave school each year, and who, in time, if wholly untrained, must swell considerably the ranks of the unemployed. Unemployment, the Premier added, was one of the main causes of lowered morale and social unrest. The toning of morale and the allaying of social unrest should be among the foremost objectives of a modern scheme of national education.

Mr. Forgan Smith then went on to speak of the necessity of co-ordinating the educational system with the requirements of trade and industry. In 1924, when he was Minister for Works, he said, he gave close attention to the question of apprenticeship. As a skilled craftsman, the necessity for adequate preparatory training for the future skilled workers was apparent to him. From his own experience he could appraise the value of a sound system of apprenticeship. The result was the *Apprenticeship Act of* 1924. He was glad to say definitely that the Queensland apprenticeship system had become established on a firm basis. Competent judges gave high praise to the skill of Queensland workers trained under the system.

The Premier stressed the importance of vocational training for both the primary and secondary industries, and referred appreciatively to the scope and standard of secondary education within the State and also to the possibility of even a greater flexibility in adapting itself to the needs of the State. Speaking of the University, he said that, possibly, it more than any other kindred institution was expected to grapple with the changing conditions of a changing world and adapt itself quickly to shifting circumstances. Less and less must it be a cloistered institution, and less and less must it live a life of aloofness. Concluding, he said: "The activities of the State continue to widen steadily; the responsibilities, obligations, and complexities of government grow apace. Close and friendly relationship should exist between University and State. The State should be able to look to the University not only for intellectual leadership, but for guidance and help in the solution of many of its problems. But if the State expects this service it follows that the University should be properly constituted and equipped to render the service."

Value of Fertilizers.

"THROUGHOUT the world people are beginning to realise that only a certain amount can be taken from the land before something must be put back into it," said the Acting Minister for Agriculture and Stock, Hon. D. A. Gledson, at the recent opening of new chemical and fertilizer works* at Pinkenba.

"Production has increased enormously in the past few years in Queensland," he added. "With the aid of fertilizer companies the Department of Agriculture has been able to advise the farmers what is necessary to get the maximum productivity from the soil. It does not matter how much land there may be or of what quality it is, unless something is put back, it will become useless."

Continuing, Mr. Gledson said that with the new factory, fertilizers best suited to Queensland soil conditions would be produced. The enterprise starting that day would manufacture sufficient superphosphate to supply the whole of Queensland. At present superphosphate had to be imported. The company would supply Queensland with fertilizer that would enable present production to be maintained. The Department of Agriculture and Stock would assist the enterprise in its endeavour to produce the best from the land and to give farmers the best advice as to what fertilizer to use with their particular soil types. On behalf of the Government, he congratulated the company concerned on its enterprise.

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* A.C.F. and Shirleys Fertilizer, Ltd.

Some Parasitic Diseases of Livestock in Overseas Countries of Interest to Australia.

F. H. S. ROBERTS, D.Sc., Animal Health Station, Yeerongpilly.

In June of last year Dr. Roberts was sent overseas by the Minister for Agriculture and Stock, Hon. Frank W. Bulcock, to investigate the control of parasitic diseases of livestock in other countries. Dr. Roberts was away from Australia for nearly eight months, and during that time visited the United States of America, Canada, Great Britain, Holland, France, and South Africa. As might be expected where domestic animals are concerned, there are many parasitic diseases of livestock common to those countries and our own. A short account of the more important of these diseases as they exist in other lands, as now presented, will be of interest to readers of this Journal.—Ed.

THE BLOWFLY PROBLEM.

AUSTRALIA is not the only country where blowflies have become serious pests of stock, for in the United States, Great Britain, South Africa, and New Zealand these insects are also notorious in this respect. Before we discuss the position as it exists overseas, let us consider the status of the problem in Australia.

Occasionally we hear of calves being struck on the pizzle and of cattle being attacked after dehorning, but, for the most part, strike in Australia is associated with sheep. The flies deposit their eggs in the wool on any part of the body, but most frequently in the region of the crutch. Wounds or broken skin are not necessary to initiate strike; in fact, in nearly all cases blowing takes place over the unbroken skin. In order to attract the flies the area must be moist and must remain moist for the development of the maggots. Frequently, the maggots are able to complete their growth without penetrating the flesh, but in cases where restrike occurs, particularly if hairy maggots are present, the maggots may eat into the flesh. Waves of strike are most common during the spring and autumn, sometimes being continued well into the winter, if the winter be mild and wet, as it is sometimes in parts of Queensland. The most important sheep blowfly in Queensland is a greenish bronzy fly, *Lucilia cuprina.* Next in importance are the brown blowflies, *Calliphora spp.* These are native flies, whilst *L. cuprina* is an introduced species. The hairy maggot fly, *Chrysomyia rufifacies,* on account of the manner by which its larvæ behave in a wound, was at one time considered to be the most serious species, but it has since been discovered that in the absence of *L. cuprina* and of the brown blowflies the hairy maggot fly would be of little importance.

The measures advised in Australia to combat the sheep blowfly pest are—(1) crutching, (2) jetting, and (3) culling, or breeding out wrinkly sheep, which are the most susceptible to strike. Control of the flies by means of parasites has been thoroughly investigated, but offered no encouragement. The possible use of traps is still being studied, and every effort is being made to find a suitable dressing for treating the wounds of struck sheep.

Let us now consider the blowfly problem in Great Britain, where again only sheep suffer. Strike in sheep in this country has been known for centuries, but it was not till about 1931 that it was regarded as a serious problem. Since then several severe outbreaks have occurred. Scouring is a source of attraction as it also is in Australia, resulting in crutch strike, but body strike is much more common. One of the most frequent causes of body strike is the pus left behind on the body wool of animals suffering from foot-rot, the wool becoming contaminated from the feet when the animal lies down. Wool rot, also seen in Australia, tick bites, and bits of rotting bracken in the wool are also conducive to body strike. The flies are most abundant during June to September, the most important species being *Lucilia sericata.* This species has been introduced into Australia, but has never developed into a serious pest of sheep. Cases are known of this species striking sheep here, but are relatively few. Another blowfly of importance in Great Britain is *Phormia terrae-novae,* which occurs in Scotland. Scotland suffers much more seriously than England from sheep blowflies, for whereas in England the farms and flocks are small, so that struck sheep are immediately noticed and dressed, in Scotland farms and flocks are much larger and the country rougher, and here struck sheep can easily elude the shepherd and hide away in the bracken.

Crutching and jetting are not employed in Great Britain as preventive measures, though recently investigators are showing some interest in crutching. Dipping in an arsenical fluid is used widely as a means of controlling strike, and it is claimed that this will give two to three weeks' freedom from the fly. Some authorities in Scotland favour spraying rather than dipping, for it is considered that to use a dip which has become foul with manure and urine from sheep is a certain way of securing strike. At present, the main researches in Great Britain are directed towards dressings and securing an arsenical fluid which is not leached from the wool by rain as readily as the mixtures now being used.

In South Africa, the sheep blowfly problem is very similar to that in Australia. It is of comparatively recent origin, and can be traced to the introduction of the Merino sheep. Although as yet not as serious as in Australia, it is increasing in importance and is a cause of serious economic loss. *Lucilia sericata,* the English sheep blowfly, which has also been introduced into South Africa, and the native blowfly, *Chrysomyia chloropyga,* are responsible for most cases of strike. Control measures are similar to those adopted in Australia, though not as yet developed to the same extent.

South Africa has yet another blowfly problem which is most serious among cattle. The fly concerned is the screw worm fly, *Chrysomyia bezziana,* which in its habits and life cycle is similar to the American screw worm fly, *Cochliomyia hominivorax,* which is discussed below.

In the United States there are two quite distinct blowfly problems. There is, firstly, a sheep blowfly problem similar in most respects to that of Australia, and secondly the screw worm problem, in which almost any domesticated and wild mammal may be attacked. In comparison to the seriousness of screw worm, wool maggot flies are of relatively little importance. Strike in the wool of sheep occurs principally among the finer woolled sheep of Montana and Wyoming, and is seen chiefly during the spring following lambing or scouring. The black blowfly, *Phormia regina,* is the most serious fly, whilst in the south and south-west *Lucilia* *sericata* is frequently responsible. Our species, *L. cuprina,* also occurs here, but is of no importance as a wool maggot fly whatsoever. Very little work has been done on wool maggots within recent years, as this problem has been so dwarfed by that of the screw worm.

The American screw worm fly, *Cochliomyia hominivorax,* is found in tropical and sub-tropical America. It is only in this region that the fly can survive through the winter; but each year, with the onset of the warmer and moister conditions of the spring, the flies become very abundant and gradually migrate northwards. This migration is eventually checked when the summer temperatures become too high and the rainfall too low for the flies to survive. They then become very prevalent again during the more favourable conditions of the autumn. In the southern United States, with its summer rainfall the flies may also at times be prevalent during the summer. The flies are thus most numerous during the spring and autumn, and have much the same seasonal distribution as our green sheep blowfly.

The screw worm fly is an exception among the blowflies, as it never lays eggs on carrion. These are deposited only on living animals, and the larvæ, as a rule, will develop only in living flesh. It will attack almost any warm-blooded animal, and will lay its eggs on any area where blood serum or pus is present. It is also attracted to the navel of new-born animals and the external genitals of animals which have just given birth. The maggots, on hatching, burrow straight into the flesh, the larvæ tearing off pieces of living tissue, which they devour. Livestock, including poultry, suffer intensely, and if unchecked the wounds may prove fatal. When one considers how easily wounds attractive to the fly can be made, some idea of the seriousness of this pest can be gained. It is most serious in the south, particularly in Texas. This State is the centre of the mohair industry of the United States, and Angora goats appear especially prone to attack. So severe have the losses become in recent years that the Insect Pests of Man and Animals Branch of the Federal Department of Agriculture are undertaking an intensive study of the problem. There are four field stations of this division in the south, three in Texas, and one in southern Georgia. A good deal of work is being done on wound studies, dressings, and control, both by biological means and by trapping. In the region of the coast of the Gulf of Mexico there occurs a species of tick, infestation by which is a notorious source of attraction to the fly. The field station in southern Georgia is studying this aspect of the problem. At present, control measures advised include—(1) elimination of all factors likely to cause accidental wounds; (2) such operations as shearing, dehorning, castration, &c., should be made as bloodless as possible and should be confined to times of the year when the flies are least prevalent; (3) births should be gauged to occur also during these periods. Experimental work has shown that in the near future very efficient dressings may be expected.

It is of interest to know, whilst blowflies are being discussed, that infestation of wounds by the maggots of these flies may at times be beneficial. The fact was first noticed during the Great War, when it was observed that the presence of maggots in a wound actually assisted in its healing. Maggot therapy, as it is known, has been used extensively during recent times, and with much benefit in the case of such delayed healing wounds as osteomyelitis. The maggots employed are reared under sterile conditions to prevent introducing harmful bacteria into the wound. The objection raised by many patients against having live maggots in their flesh and also the difficulties of maintaining supplies of maggots led to further researches by Dr. W. Robinson, of the Federal Department of Entomology, and he found that the healing substance was urea which is excreted by the maggots, and again that allantoin was the active constituent of urea. To-day, both urea and allantoin are proving of great value in the healing of such indolent lesions as osteomyelitis and bad burns, and when applied internally have shown themselves of benefit in the treatment of diabetes.

THE TICK PROBLEM.

This is another problem of vital interest to Australia. In this country we have two major tick problems. The more important of these is that great scourge of cattle which was introduced from the East during the nineteenth century—namely, the common cattle tick, *Boophilus australis.* As is generally known, this pest is most notorious as a vector or carrier of cattle tick-fevers, but even in the absence of these fevers there is a tremendous loss to the cattle industry from "tick worry" and hide damage. The second tick problem of major standing in Australia is associated with the scrub tick, *Ixodes holocyclus,* which causes paralysis and death among dogs, cats, sheep, calves, foals, and pigs.

The cattle tick, *Boophilus australis,* is found in Queensland, northern West Australia, and in the north-eastern corner of New South Wales, whilst the scrub tick is an inhabitant of the scrubs of the eastern Australian coast as far south as southern New South Wales.

In the southern United States there occurs a species of cattle tick which, in its habits, economic importance, and structure is very similar to our common cattle tick. There are, however, sufficient differences in the structure of the two ticks to give the American species the name *Boophilus annulatus.* By 1906 no less than 741,500 square miles in the southern United States were under quarantine on account of this tick, an area a little larger than the entire State of Queensland. It was at this time that the Federal Bureau of Animal Industry commenced its campaign to eradicate the pest, and so vigorously and successfully has this campaign been carried out that, to-day a little more than 95 per cent. of this area is clean. The main factors by which these results have been achieved may be reduced to four—(1) regular fourteen-day dippings of all cattle and horses in 0·2 per cent. solution of arsenic for a period of nine months from the finding of the last tick; (2) areas which are too rough to permit the regular mustering of cattle for dipping are emptied of stock and the ticks starved out; (3) legislature regarding the movements of cattle from ticky to clean areas; and (4) an intensive education campaign among the stockowners of the tick-infested areas.

No attempt is made either in Queensland or West Australia towards eradication. There are, of course, certain restrictions which must be complied with when cattle move from tick-infested areas, which aim at preventing the tick from spreading beyond the areas it now occupies. Dipping, otherwise, is left to the discretion of the stockowner, and is utilised as a means of control and not of eradication. Under our present system of cattle-tick control it would be dangerous for any stockowner to attempt eradication. The immunity of cattle to tick fevers lasts only so long as the animals are infested by ticks, and for any stockowner to eradicate the ticks from his own property whilst his neighbour's cattle remain infested would in time leave his cattle readily susceptible to tick fever by invasion by infected ticks. In New South Wales, however, an attempt is being made to eradicate the pest by employing regular fourteen-day dippings in an 0·2 per cent. solition of arsenic. Here the position is somewhat different to that existing in Queensland, as tick fevers are far from being prevalent.

Returning now to the United States, the only areas where the cattle tick is now to be found are in southern Texas bordering the Rio Grande River, a further area in Texas along the Gulf of Mexico, and another area in central Florida. Rather strangely the tick infesting cattle in Florida is *Boophilus australis,* which also occurs in the West Indies. In these islands it is interesting to note that in the eradication campaign being undertaken there, not only cattle and horses must be considered, but also sheep and goats, which are readily infested.

Eradication of the tick from Florida presents grave difficulties. There is little co-operation to be expected from the Indian owners of cattle, and the country infested contains much swamp and jungle which abounds with deer which are suitable hosts for the tick. One of the first steps to be undertaken by the Bureau of Animal Industry towards eradication of the tick in Florida is the removal of the deer from the infested areas, the intention being to restock with deer from clean areas as soon as the ticks have been wiped out.

Emphasis has been given to the role of cattle ticks as vectors of tick fevers. One of these fevers—namely, anaplasmosis, which occurs also in Australia, is causing grave concern among the authorities in the United States at the present time. *Boophilus annulatus* is a recognised natural vector of this disease, but serious outbreaks still occur in areas from which this tick has been eradicated. It is known that the disease may be conveyed by mechanical means, such as by dehorning, and it has also been shown experimentally that the disease may be carried by other species of ticks such as the dog tick, *Rhipicephalus sanguineus.* Outbreaks, however, still occur, whose origin remains unknown, and the opinion is held in many quarters that the disease is being spread from some native reservoir animal by such vectors as biting flies.

In the region of the coast of the Gulf of Mexico another tick problem presents itself. This is the habitat of *Amblyomma maculatum,* commonly known as the Gulf Coast tick. It commonly attaches to the ears of animals causing much swelling, irritation, and abscess formation. One of its most important features is its association with screw worm, for the wounds it makes are very attractive to the fly. At present, the only means of control is hand-dressing the infested ears.

In the western mountainous section of the United States, in the vicinity of the Rocky Mountains and Cascade Mountains, there is found probably the most notorious tick known. This species is *Dermacentor andersoni,* commonly known as the Rocky Mountain Spotted Fever tick, because it transmits to humans a deadly typhus fever of this name. The mortality rate is high, but recently the discovery of a vaccine which has protective properties has made this region comparatively safer. The disease is transmitted by the adult tick, which is the only stage attacking large mammals, the larvæ and nymphs being confined to small wild mammals. This tick also causes paralysis among live stock, which is of the same type as that produced by our scrub tick, *Ixodes holocyclus.*

A milder strain of this typhus fever is found in the east where the vector is *Dermacentor variabilis.* This is a very common species of the woods in this area and is frequently found on dogs. An attempt to control this tick is being made at the present time by the Federal Department of Agriculture and among the several measures being investigated is biological control.

During recent years biological control has been very prominent in the minds of Australian stockowners as being of possible assistance in the control of our cattle tick. Ticks are known to be parasitised by two species of tiny wasp-like insects. One of these, *Ixidophagus texanus,* has been found only in the United States, and the other, *Hunterella hookeri,* also in France, Africa, India, Indo-China, Cuba, and Brazil. In all cases where these parasites have been collected they have emerged chiefly from the nymphal tick, and rarely from the larvæ. So far, they have never been recorded as parasites of ticks which remain on the one host for their entire parasitic cycle, such as the species of Boophilus, to which our cattle tick belongs. As observations have shown that the nymphs may be parasitised whilst feeding on the host, it would seem possible to establish these parasites, particularly *Hunterella hookeri,* which has a wider range of tick hosts than *Ixidophagus texanus,* on species of Boophilus. Whether such an attempt would be worth while, however, is also to be considered. So far as is known both these parasites are relatively scarce wherever they occur, and an attempt to control *Dermacentor andersoni* by *Ixidophagus texanus,* has not given encouraging results.

Great Britain, contrary to most people's belief, also has a tick problem. The tick concerned is the castor bean tick, *Ixodes ricinus,* so called because of its similarity in shape to a castor bean. In Europe it is a vector of a tick fever of cattle, and in Great Britain has recently been shown to be also a carrier of two serious diseases of sheep—namely, louping ill and tick-borne fever. Furthermore, its presence on sheep in certain areas is a source of attraction to the blowfly. The young stages are also a cause of serious mortalities among grouse. At present control rests on certain farming practices and dipping or spraying in an arsenical dip.

One could write at great length on the tick problems of South Africa. This country is almost unrivalled in the wealth of its tick fauna and in the number of serious diseases which these transmit to domestic animals. To mention just a few of the more important of these tick-borne diseases, there is East Coast Fever, a veritable scourge of cattle in this country, heartwater of sheep and cattle, biliary fever of horses and dogs, and tick fevers of cattle. These tick fevers of cattle are the same as we have in Queensland, and are carried by *Boophilus decoloratus* and other ticks. No attempt is made to eradicate any species of tick, except the vector of East Coast Fever, and, so far as this species is concerned, eradication is associated only with areas in which outbreaks of the disease occur. All ticks are controlled by arsenical dips. These consist of a simple solution of sodium arsenite in water. No fats, oils, or soaps are added, as the South African authorities do not believe that the addition of substances such as these to the dip increases the "wetting powers" of a dip or make it more effective against ticks. For five to seven day dippings, such as are employed against *Rhipicephalus appendiculatus,* the chief vector of East Coast Fever, the strength of sodium arsenite employed is 0·2 per cent., whilst for fourteen-day dippings, as are used for *Boophilus decoloratus,* the strength of the dip is increased to 0·3 per cent. of sodium arsenite.

DIPS FOR SHEEP AND GOAT LICE.

The opinions with regard to dipping fluids for sheep and goat lice vary considerably in different countries. Here in Australia we employ either an 0·2 per cent. solution of arsenic or dips containing phenols and cresols. In England, arsenical dips are preferred, and one is informed that the most heavily-infested sheep are to be found on farms employing phenolic dips. In South Africa, on the other hand, phenolic dips are preferred. In the United States, neither of these types of dips are considered satisfactory, and during the past few years a good deal of work on dips for lice has been carried out. These investigations have been concerned chiefly with goat lice, as in Texas lice infestation among the Angora goats is a serious source of economic loss to the mohair industry. Of the many substances tested, sulphur was found to be most efficient, not only for goat lice but also for lice on sheep. The sulphur must be in a very finely divided state, so fine that the particles would pass through a sieve containing 325 meshes to the square inch. Soft water must be used so that the sulphur may remain in suspension; if the water is hard, a softening agent must be employed. Two dippings at an interval of eleven days are recommended, each in a freshly charged vat.

NASAL BOTS IN SHEEP.

During recent years much work has been done in the United States and South Africa on the use of fluids which will kill the grubs of this bot fly as they lie in the nasal passages of the sheep. In the former country a 3 per cent. solution of lysol forced into the passages under pressure is now considered to be very effective, whilst in South Africa a small quantity of tetrachlorethylene emulsion injected into each nostril has given very good results.

WORM DISEASES.

Sheep.

If it were not for drought, blowfly, and worm diseases, the sheep industry of Queensland would indeed be in a flourishing condition. Worms occur in sheep practically everywhere in our State, even as far west as Cloncurry, Longreach, and Cunnamulla. It is only in those areas, however, where the annual rainfall exceeds about 19 inches, that worms become sufficiently prevalent to cause disease, and the higher the rainfall the more serious do worm diseases become. The most important species in Queensland is the large stomach worm, *Hæmonchus contortus*, which is followed closely by the nodule worm, *Oesophagostomum columbianum*. Occasionally, also, we see outbreaks due to hair worms, *Trichostrongylus* spp. In Southern Australia the large stomach worm and nodule worm become less prevalent, most outbreaks being associated with hair worms. Bluestone, carbontetrachloride, or bluestone and nicotine sulphate, are recommended as drenches for stomach worms, whilst the latter mixture is the only remedy we have of any value against hair worms. For nodule worm, enemas of a watery solution of sodium arsenite are advised.

In the north-western section of the United States—i.e., California, Oregon, and Washington—most of the damage is caused by two species of little consequence in Australia. Both of these are tiny worms infesting the fourth stomach and are called *Ostertagia circumcincta* and *Trichostrongylus axei*. Tetrachlorethylene is used extensively as a drench and is said to give very satisfactory results.

Further south in Texas, where the climate is very similar to Queensland, sheep suffer from much the same species of worms as they do here. The Angora goats in this section also suffer severely. Our species, the large stomach worm, the nodule worm, and hair worms, are very prevalent, though the nodule worm does not appear to be as serious as it is either in South Africa or Australia. Kids, particularly, are severely attacked by hair worms. Goats are browsing animals and do not graze as do sheep and cattle, and consequently goat country in Texas is characterised by heavy growths of edible shrubs. In the wetter parts of Texas, worms are so prevalent that regular three to four weekly drenching is necessary to maintain the flocks. The copper sulphate-nicotine sulphate drench is used extensively. It is not as strong as the one employed in Australia and is regarded as being very effective and quite safe. The only warning given to users of this drench is that it is unwise to treat animals, especially young kids, in the heat of the day.

The large stomach worm and nodule worm continue to be important pests of sheep right along the eastern areas to south-eastern Canada. In fact, in this latter area the nodule worm is considered as the chief factor in preventing sheep raising from flourishing. No attempt is as yet made to apply a treatment for nodule worm in the United States or Canada, though investigations are at present in progress.

In Great Britain, the lesser stomach worm, *O. circumcincta,* and the hair worms are the most harmful species. Outbreaks due to *H. contortus* do occur, but are comparatively rare. The nodule worm is entirely unknown in this country. Bluestone and nicotine sulphate of about the same strength as we use for hair worms in Australia is employed and is very satisfactory. The liver fluke is serious, as it is also in the mountainous country of Western America, particularly in the State of Montana. Carbontetrachloride is used in all countries as a treatment for liver fluke, and is attended by the same unexplainable losses which have condemned its being employed against stomach worm in Queensland. The only area encountered by the writer where this drug could be used safely is in North Wales, where he was informed carbontetrachloride poisoning of sheep is unknown. In the Hawaiian Islands cattle are seriously infested by a closely allied species, *Fasciola gigantica* (the liver fluke of sheep is *F. hepatica*), and here hexachlorethane, a drug closely allied to carbontetrachloride is being used successfully. In all probability the future will see this drug employed instead of the risky carbontetrachloride against liver fluke in sheep.

In England, much attention is being given at the present time to ascertaining why outbreaks of worm diseases occur in sheep. The work being undertaken, in other words, is a study of the effects of environmental conditions which are associated with the eggs and larvæ of the worms as they occur in the pastures. Such factors as longevity of the larvæ in the pastures, what particular areas in the pastures are most suitable to larval survival, what particular type of pasture favours larval survival, &c., are receiving attention. The results of these researches are going to be of great assistance in controlling worm diseases.

In South Africa a tremendous amount of work has been done on the worm diseases of sheep. Conditions there are very similar to those present in Queensland, and as a consequence we find that such worms as the large stomach worm and the nodule worm are the most serious species. Hair worms, contrary to our experience here, are not important in

Merino sheep in South Africa, but are serious, however, in the native fat-tailed Persian sheep. Furthermore, in Australia, a fœtid dark diarrhœa, "black scours," is very definitely a characteristic symptom of hair worm disease, but has not been noticed either in England or South Africa. Hook worms are also serious pests of sheep in certain areas in South Africa, particularly in sandy types of country.

Until comparatively recently, wormy sheep were all treated by powders in South Africa. All worm remedies, by the way, are manufactured and sold to the farmer by the Government Veterinary Laboratory at Onderstepoort, which maintains a special section for this purpose. The powdered remedy is supplied in tins accompanying which are a special tin from which the powder is dipped and a set of spoons, each spoon holding the requisite dose for sheep of a particular age. The mouth of the sheep is opened by a special type of gag and the powder placed on the back of the tongue by the spoon.

In this way the Government wireworm remedy, which consisted of powdered copper sulphate and sodium arsenite, was used for years to combat the large stomach worm. Recently it has been displaced by a nodule worm remedy, which is claimed to be effective against both the large stomach worm and nodule worm. The history of the discovery of this nodule worm remedy is extremely interesting. It has been felt for some time, both in Australia and in South Africa, that if the swallowing of the sheep could be controlled so that one could be certain that in most cases a drug given by the mouth would go directly into the fourth stomach instead of falling into the paunch, as it usually does, the worms inhabiting the fourth stomach and intestines would have to contend with a greater concentration of the drug, which would thus be more effective in removing them. If any drug is swallowed into the paunch, by the time it reaches the fourth stomach and intestines it has become much diluted. Whether such a drug falls into the rumen or into the fourth stomach depends upon whether a grove, the œsophageal grove, running along the wall of the paunch remains open or is closed when the drug is swallowed. Work in Australia, and confirmed in South Africa, showed that if copper sulphate solution is placed in the mouth, its contact with the tissues there causes this grove to close in most cases, and any liquid or powder given immediately afterwards is swallowed into the fourth stomach. With this information as a guide the South African workers then set to work to find out whether by first giving copper sulphate and following it with certain highly insoluble drugs they could ensure the powders reaching the nodule worm in the large intestine in sufficient strength to remove it. Certain success has followed their efforts, for they consider that a mixture of copper tartrate and copper arsenate does have this effect. The recommendations were that the sheep be treated on two successive days. This treatment has been tried in Australia, but it was found that whilst in some sheep it had a high efficiency against the nodule worm, in others, unfortunately the majority, it removed only a few worms or none at all. Further work in South Africa has resulted in some alteration in the formula and the recommendation of only a single treatment, which is also effective against stomach worms. This more recent recommendation has still to be tested in Australia.

Hookworms have been combated by first giving a small quantity of copper sulphate and following it with a tetrachlorethylene emulsion. In the preliminary work pure tetrachlorethylene was used. This is one of the safest drugs that can be used against worms in any animal, but unfortunately it vapourises very readily, and the inhalation of these vapours into the lungs of sheep as the drug passes down the throat causes serious but temporary intoxication. The drug in an emulsified form does not have any ill effect, mixes readily with the ingesta, and at the same time is as effective as the pure drug. The dosage is rather high, which would make the use of the drug rather expensive, here in Australia at any rate, but given after copper sulphate it is highly effective against stomach worms, hair worms, and hookworms; in fact, the writer was informed that three or four doses would remove every worm, including nodule worms.

Worm Diseases in Horses.

The seriousness of red worm infestation in horses is well known. These worms vary in size from less than half an inch to about 2 inches and more. They inhabit the large intestine. Many of them suck blood, and as a result of infestation the horse becomes weak and anæmic. One of the problems in the control of these worms is the treatment of the manure so as to kill the eggs and larvæ of the worms which occur there. This aim is of most importance in cases where manure is collected from stables and stored and used as fertilizer in pastures to which horses have access. The danger of infected manure around yards and stables must also be borne in mind. This problem is being investigated in the United States and Canada. From Canada comes the information that of some hundreds of substances tested, urine is most effective. In the United States chemical treatment of manure is also being investigated, and here steam treatment is being tried out. Steam treatment requires a special storage compartment into which steam is led from a boiler through a system of coiled tubes, so that the temperature inside the compartment is raised to a point sufficiently high to kill the eggs and larvæ. This type of treatment is still in the experimental stage.

The Kidney Worm of Pigs.

This is a very prevalent parasite of pigs in coastal Queensland and the northern rivers of New South Wales. The adult worms occur in the tissues around the kidneys and sometimes in the kidneys themselves, while the immature forms are found in the liver and frequently elsewhere in the body. The effect of a heavy infestation on the pig is chiefly to prevent normal growth, but losses through meat inspection condemnations may be serious, as livers and parts of the carcase infested with these worms are always condemned as unfit for human consumption.

In the south-eastern United States losses through meat inspection condemnations are estimated to range from a little more than 1s. to nearly 3s. per pig. In these areas the old system of raising pigs was more or less left to the pig itself, which spent the daylight hours wallowing in nearby swamps and bog holes, places which in time became heavily infested with kidney worm larvæ. As the result of work undertaken by the Division of Zoology of the Bureau of Animal Industry, a system of raising pigs in these areas has been devised, which is successful in controlling not only kidney worm but other worms, such as the large round worm. The farmer is, moreover, encouraged to keep his pigs free from kidney worms by the packing companies operating in this area, who pay him so much extra for any pig in which kidney worm is absent. The educational section of the campaign is assisted by the instructors of the Future Farmers' Association, a branch of the Vocational System of Education so well organised in the United States of

America. Some idea of the success of this campaign against kidney worm is given in the 1938 report of the Bureau of Animal Industry, where, on page 82, it is stated that in a study of 121 projects in Southern Georgia, in 771 pigs from 88 projects rated as good, 80 per cent. of the livers were passed for human consumption, and only 4 per cent. of the kidneys showed worms and lesions, while of 203 pigs from 33 projects rated as poor, only 18 per cent. of the livers was passed as good, and 50 per cent. of the kidneys showed worms and lesions.

"TICK WASHING" CALVES AND ITS RELATION TO TICK FEVER.

Young cattle possess a natural resistance to tick fever, but this gradually grows weaker until at the age of twelve months for all practical purposes it ceases to exist. The foregoing applies to calves reared in clean areas and also (and this is the important point) to calves reared in ticky areas if such calves are sprayed so often and so regularly as to keep them entirely or almost entirely free of ticks. Under such conditions, the resistance to tick fever of calves in ticky areas at the age of twelve months will be little better than that of calves reared in clean areas.

The matter is worthy of close attention, as some farmers do definitely overdo the treatment of calves for tick infestations. The belief is, of course, that the growth rate of the calves will be increased and their general wellbeing bettered, but although this is true enough, it is, notwithstanding, a dangerous course to pursue, as mortality from tick fever is likely to follow at the age of eighteen months to two years or older.

Calves should be allowed to carry a reasonable number of ticks from a few weeks old onwards. In this way their natural resistance to tick fever will be continually reinforced, so to speak, so that at the age of twelve months it will be just as strong as it was during the first few weeks of life. In normal circumstances, this resistance will, if the animal is continually exposed to moderate numbers of ticks, be retained throughout life.

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Everything possible is done to ensure delivery of the Journal, and subscribers would help us greatly by observing the simple rule suggested, and thus reduce the risk of error in names and postal addresses to a minimum.

Wheatgrowing in Queensland.

R. E. SOUTTER, Senior Research Officer.

ALTHOUGH the staple food of a large section of the human race is rice, wheat is grown more extensively and, in the form of bread, is used as food by practically all the inhabitants of the more progressive countries.

EXPANSION OF WHEATGROWING.

The trend of the wheat industry throughout the world is, in general, towards expansion, for, as the standard of living in a country rises, so is wheat substituted for rye and other cereals. The wheat-bread-consuming population is increasing, and the area devoted to wheat production accordingly shows a general tendency to expand.

The chief reason why wheat is advancing in favour so universally is because it is a splendid food in itself, and, because of its gluten properties, it can readily be made into a palatable bread that is more easily digested than that made from any other cereal. Because of its wonderful adaptability, it can be grown from within the Arctic circle to the equator, besides which it has a wide range of altitude, having been encountered by explorers in the Himalayas at a height of between 14,000 and 15,000 feet. Although wheat responds well to good cultural operations, it will yield a return when very crude methods are employed, and the manner in which it adapts itself to varying climatic conditions and soils is not possessed by any other grain crop. The area devoted to its culture throughout the world in 1935 was approximately 392,000,000 acres, yielding in the vicinity of 5,513,000,000 bushels. In the 1936-37 season the acreage in Australia under wheat was 12,342,190 acres, which yielded 150,468,321 bushels, or an average of 12·19 bushels per acre.

GREATEST WHEAT-PRODUCING COUNTRIES.

The greatest wheat-producing countries are the Soviet Union, China, the United States of America, India, France, Argentine, Canada, Italy, Germany, and Australia, these countries being listed in their order of production in the 1936 season. With a few exceptions, these countries produce more than they require, but the surplus is eventually absorbed by those countries whose production of the cereal falls short of their domestic requirements.

The country wherein the highest average yield was obtained in 1936 was the Netherlands with 43·42 bushels per acre; whereas the lowest position was occupied by Iraq with an average of 6·54 bushels per acre.

Throughout the countries of the world, harvesting is going on in one or more the whole year round. The time the crop occupies the land from the germination of the seed to the date of maturity varies considerably, and, as a rule, those countries where the longest period elapses between these two dates have the highest average yield. For instance, in Great Britain it takes the crop ten months to mature and the average yield is 35 bushels to the acre; whereas in Queensland it occupies the land for approximately six months and the average yield for the decade ending 1936 was 15·52 bushels.

HISTORY OF THE CROP IN AUSTRALIA.

As a crop, wheat was first grown in Australia in 1788, when an area of 8 acres was sown. In 1799 the area devoted to it approximated 3,500 acres. In another decade it doubled, and so the increase has gone on until during the decade ending 1936 there was an acreage of 14,185,784 acres yielding 163,860,707 bushels.

HISTORY OF THE CROP IN QUEENSLAND.

Although the wheatgrowing industry has expanded in a remarkable way in Australia as a whole, in Queensland (Plate 217) it has not by any means kept pace with development in the other States, notwithstanding the fact the Queensland average of 15·52 bushels is higher than that of the four chief wheat-producing States—namely, New South Wales, South Australia, Victoria, and Western Australia. This lack of progress cannot be put down to the unsuitability of the soil, for yields of up to 66 bushels per acre have been obtained without the use of fertilizers, and yields of up to 40 bushels to the acre are not uncommon in some seasons on farms which have been cropped for many years.

As far back as 1867, the statistics of the State showed a wheat area of 2,657 acres. Six years later 81,008 bushels were harvested. In 1888—fifteen years later—records show that only 500 acres were harvested for a yield of 8,265 bushels, necessitating, in order to meet requirements, the importation of 2,000,000 bushels—*i.e.*, approximately 240 for every one produced. In 1891 the yield was 392,309 bushels—the highest obtained up to that time. The fluctuations in yield and area still continued. In 1930 272,316 acres were harvested for a yield of 5,107,561 bushels. In 1936 the area sown was 11,000 acres in excess of the area sown in 1930, but the yield was considerably less than half of that obtained in the earlier season. The 1937 yield totalled 3,749,443 bushels, while that for 1938 is expected to reach a total of 8,000,000 bushels.

CLIMATIC INFLUENCES ON YIELD.

It is evident that seasonal conditions have a very marked influence on the wheat yields of this State.

The countries wherein wheat is grown most successfully—by which is meant the countries in which the growers obtain the highest average yield per acre—have cool and moist conditions during the growing period; whereas at harvest time the reverse is experienced, the weather normally being warmer and bright and dry. Conditions similar to these are experienced in the Southern States of Australia, but a glance at the rainfall chart for this State shows that the season of greatest rainfall occurs during the summer months when the wheat crop is not occupying the land and when weed growth is most prolific and evaporation greatest. Again, the season of the most meagre rainfall coincides with the most critical stage in the crop's growth, when a sufficiency of available moisture is of vital importance to the success of the crop. Furthermore, the harvest period in the chief producing centres coincides with the onset of the stormy season. These factors in themselves would appear to be sufficient to prevent the industry from becoming of material importance in Queensland. When the rust scourge is also taken into consideration, it is not only gratifying that the industry has assumed the proportions it has, but it is also highly satisfactory to be able to record the fact that Queensland's average yield per acre exceeds that of the four chief producing States of the Commonwealth.

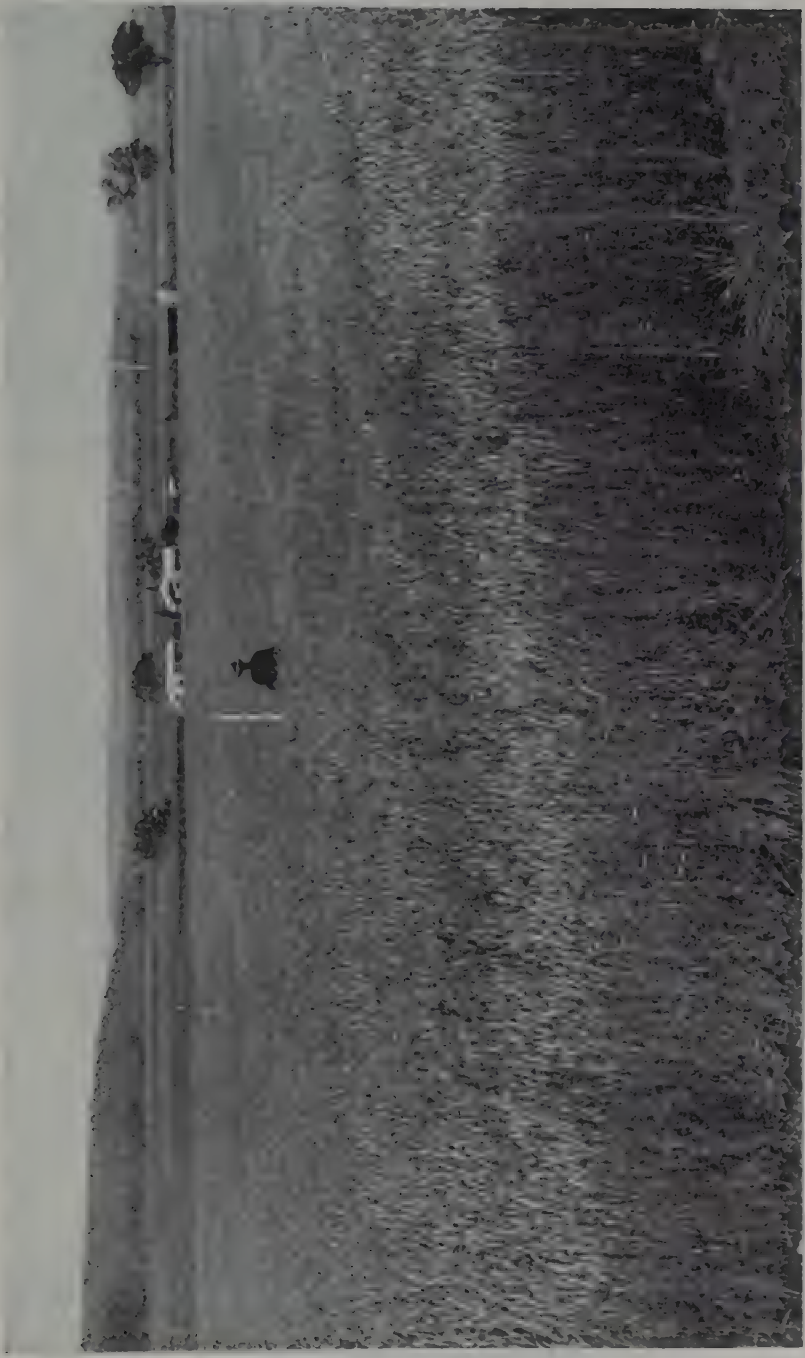

Plate 217.

A WHEAT FIELD ON THE DARLING DOWNS.

PROSPECTS OF THE INDUSTRY IN THE STATE.

There was a period when it was considered that, no matter how successful endeavours to evolve wheats suited to Queensland conditions proved to be, it was problematical whether the industry would expand or recede from its then existing dimensions. The outlook, however, has definitely improved, and the chief factor in bringing this about has been the installation of tractors on the farms in conjunction with the all-round improvement in agricultural machinery, the use of which is now termed ''power farming.'' The benefits accruing to the industry from its use are manifold. It has raised wheatgrowing to a considerably higher plane and removed it from the state of drudgery which characterised this branch of primary production when horses were exclusively used as the motive power. It also enables large areas to be dealt with more expeditiously and efficiently, resulting in gross returns being obtained which could not have been hoped for under the old conditions. A farmer is thus able to grow sufficient acreage to recover quickly from a crop failure, which was a very protracted business, even in the best of localities, on the restricted areas it was possible to operate when only horses provided the power.

WHEAT-GROWING DISTRICTS.

The Darling Downs Division provided the greatest wheat acreage for grain in 1937, the total therein being 343,136 acres; the Maranoa came next with 22,782 acres, Port Curtis being third with 3,657 acres, while the Moreton Division and Wide Bay were represented by 1,761 and 1,579 acres respectively. The Rockingham Division gave a return of 20 acres.

On the Downs the chief producing centres are Pittsworth, Oakey, Clifton, Dalby, and Allora. It might be mentioned that if the present rate of expansion taking place in the Dalby District continues for a few more seasons, that district will be in the premier position. The Downs embraces what might be regarded as the safest area for the further expansion of the industry. In the Maranoa wheat has been grown with varying success since 1882, but the area under crop for grain has been practically stationary for the last twenty years. The figures for Roma, which includes a strip on either side of the western line extending from Wallumbilla to Bindango—a distance of about 45 miles—show that 21,000 acres were cropped in 1936, and at Mitchell—54 miles west of Roma and 372 miles from Brisbane—1,779 acres appear for the same season. Except on the lighter soils in this Division, wheatgrowing is a somewhat uncertain proposition because of the erratic rainfall. In the Port Curtis Division 1,294 acres were sown in the 1936 season. This Division contains a large area of potential wheatlands, and at the moment there are indications that a movement in the direction of expansion is imminent.

TYPES OF SOILS SUITABLE FOR WHEATGROWING.

Other conditions being favourable, wheat can be grown successfully in Queensland on all types of soil ranging from those of a light sandy nature to the heavy black soil of the Downs country, it being from the latter type that the bulk of the State's wheat crop has up to the present been produced. It is only in those districts which are better favoured with respect to rainfall that the heavy black type of soil can be farmed successfully. In the drier areas here, as in other parts of the world, the lighter soils are by far the most reliable where the rainfall has to be wholly depended upon as the source of moisture supply for the crops. Sowing on the very light sandy soils of a depth of several feet is not recommended, however, for in excessively wet seasons the leaching of nitrate nitrogen is so great that the crop may be starved for this necessary nutrient.

The heavier types of soil induce a more luxuriant growth, which makes a much greater demand upon the moisture contents of the soil.

Another and very important factor is that light showers of rain are frequently experienced which are of considerable value in the lighter soils, in which, because of their low moisture-holding capacity, they penetrate to a sufficient depth to be available to the crop. On the heavier soils, on the other hand, such light showers are only sufficient to dampen the surface, and after a few hours' sun all trace of them has vanished. The lighter soils are therefore, in general, superior to the heavier types in dry districts and in seasons of light precipitation, but not in wet districts or in seasons of excessive rainfall.

PLANT REQUIRED.

The next point for consideration is the plant required for wheat production on a small scale. There is no crop which can show greater and more revolutionary changes in the machinery and implements used in its production during the last decade than wheat. For instance, less than forty years ago a farmer with 80 acres of suitable land on the Eastern Downs possessing three horses, their harness, a single-furrow plough, a set of harrows, and a reaper and binder was considered sufficiently well equipped to take up wheatgrowing. To-day the position is very different, and embarking in the industry with an up-to-date plant, which is really essential to success, is an expensive business. It has, however, the compensating factor that the chances of success have also been very much enhanced.

The plant required for grain production will of necessity include the following equipment, the estimated cost of which will be in the vicinity of £1,000:—A tractor, a multiple-furrow plough, a cultivator-drill, a header-harvester, harrows, a utility truck, and a shed for housing this equipment.

COST OF PRODUCTION.

It is not intended to enter into estimates as to the cost of production or possible income from a given area. Many factors, some of which are wholly uncontrollable, have to be taken into consideration in endeavouring to frame such an estimate, the degree of accuracy of which might be by no means high.

Having the land and the necessary plant does not mean that success is assured even if climatic conditions are favourable, for the ultimate result depends in large measure upon the effectiveness of the cultural methods employed and the suitability of the varieties chosen.

CULTURAL METHODS.

Even in the more favoured districts on the Darling Downs, where climatic conditions are such that fair to good crops are obtained nearly every season, the universal practice of the short fallow tends to raise the average yield of wheat. In the Maranoa and Western Downs, where the rainfall is less, the adoption of the long fallow in conjunction with the short fallow is, however, considered essential to success. The value of the long fallow in these two districts was demonstrated by a case in which a yield of 24 bushels to the acre was obtained from a 30-acre field worked thus, on a rainfall of under 2 inches during the growing period of nearly six months; whereas that secured on the short fallow section was only 17 bushels to the acre.

These yields were obviously not produced solely on the rain experienced during the growing period, but were obtained through the moisture and plantfoods that had been conserved previously in the soil. Investigations have demonstrated that, under normal conditions, 7½ inches of water are required to pass through a crop to produce 25 bushels of wheat; hence, even supposing the whole quantity which fell as rain were available for the use of the crop, it was necessary for the moisture content of the soil to be sufficiently high to admit of approximately a further 5½ inches of water being utilised by the plants to produce the 24-bushel crop.

No hard and fast rule can be laid down regarding the conservation of the necessary soil moisture, for the controlling factors are many. The individual grower must, therefore, decide as to the most desirable course to pursue to meet the requirements of his own particular case. Some guidance, however, can be obtained from the suggestions contained in the following paragraphs on cultural operations generally.

Fallowing.

The difference between a long and short fallow (Plate 218) is that with the former the land is cropped every second year with wheat and during the interim is worked with the object of conserving the maximum amount of moisture in the soil from the rains that occur. The short fallow, on the other hand, is sown to a winter cereal every year, the first cultural operation following immediately harvesting has been completed. With the adoption of a system embracing the long and short fallow, it is advisable to apportion the area to be cropped in three equal sections, two of which will be sown during the first season on a short fallow, the third being worked but not sown until the following year, thereby constituting the first cropped long-fallow area. In the second season one of the two sections will again be sown constituting the short-fallow portion of the crop; whereas the balance will constitute next season's long-fallow block.

As a result of this procedure, two-thirds of the area devoted to wheat will be cropped every year, half of which, after the first year, will be on a long fallow and half on a short fallow.

The practising of the long-fallow in Queensland might be objected to on the grounds of the cost of maintenance of a clean fallow through two summers as well as in the winter, when a considerable weed growth is experienced, before a crop is obtained. It must be remembered, however, that it is advisable to combine sheepraising with wheatgrowing in order to produce wheat economically. Where sheep are available, weed growth can be largely controlled through the long-fallow period. When the additional costs of ploughing, seed-bed, preparation, seeding, and harvesting incurred in the annual planting of wheat are considered, it can be realised that a high yield is required every season to offset this extra expense as compared with that met with in the practising of the long fallow.

In addition to the conservation of moisture, another very important benefit is obtained through the practising of the long-fallow—namely, the eradication of winter weeds. Undoubtedly, the growth of winter weeds is becoming so serious on the average Queensland wheat farm as to nullify to a great extent the increase in yields which should be obtained through the use of improved varieties and cultural methods.

Plate 218.
PREPARING A FALLOW FOR WHEAT.

It is imperative, therefore, that the long fallow should be practised more extensively, for this is the most economical method of eradicating winter-growing weeds.

At the Roma State Farm, where the soil is inclined to set hard, the method adopted in fallowing has been to commence operations as soon as possible after harvesting, the idea being to have the whole of the area to be cropped in the following year worked over before the end of December.

If the soil is too dry to be satisfactorily dealt with by the plough, it is double-disced with the disc harrow. This results in the stubble being well broken down, as it is seldom that sufficient growth is produced to enable a burn being obtained. Weeds are destroyed or checked by the double-discing and the surface is more or less broken and roughened, resulting in the trapping and percolating into the soil of a good percentage of the subsequent rains. It is remarkable, more particularly on those areas where the soil is inclined to set hard, how much longer such land remains in a favourable condition for ploughing than that not so treated.

Plate 219.
PLOUGHING A WHEAT STUBBLE FOR THE FOLLOWING WHEAT CROP.

Ploughing.

In this State the bulk of the rainfall, which is frequently of a torrential nature, is experienced during the period when the land is in the course of preparation for the wheat crop. As the cultivation should then be free from plant growth of any kind, the danger from erosion is very considerable. In view of this, the wisest course to pursue is to devote to wheat the area on the farm where such erosion is least likely to take place. Where there is even the slightest slope, all cultural operations should follow the level contour of the fields, for this practice greatly increases the moisture-trapping capacity of the cultivations and thus helps to reduce erosion.

Ploughing (Plate 219) should be commenced as soon as the land is in a fit condition to carry the tractors or teams satisfactorily after rain has fallen; the same degree of urgency does not exist on land already disced, as this will remain in good ploughing condition longer than the untreated. Once it was considered necessary to plough the land deeply in order to secure a suitable seedbed for wheat. This, however, has been shown to be a fallacy, for not only is it not essential to do so, but, in the event of having been carried out late in the season, or if the subsequent conditions are unfavourable for soil consolidation, it may even prove harmful and in a season of very light rainfall may result in the failure of the crop. The depth regarded as giving the best results on most classes of soil is in the vicinity of 5 inches, which depth, when worked up, provides a good mulch and seed-bed. Ploughing to this depth will also ensure that the soil will trap and retain a high percentage of the rain when heavy falls are experienced. The trapping of the rainfall is particularly necessary in the case of soils in which penetration takes place slowly in the absence of deep ploughing.

After the first ploughing the inverted soil is permitted to lie in its rough state for five or six weeks, or until sufficient rain has fallen to mellow it, so that a good harrowing will reduce it to the desired condition.

All subsequent tillage operations should be directed towards the retention of soil moisture by preventing the formation of a hard crust and keeping down the weeds. If the mulch has been destroyed by a fall of rain, the necessary cultural operations should be given as soon as possible to restore it.

Surface Mulch.

On most farms a set of harrows and a tine or disc cultivator are included in the plant, either of which will be found capable of mulching the soil. Should the soil be in good physical condition and free from weeds, the ordinary harrows will do. If it is weedy and the surface has set, the spring tooth or perhaps the one-way cultivator will have to be brought into service. If the ground is clean but set too firmly to respond to the harrows, the tine cultivator is the best to use, for it leaves the surface cloddy or uneven, and consequently it does not bind and run together quickly.

Whatever implement is used, the restoration of the mulch should not be attempted before the soil is in a condition to respond fully to treatment.

Depth of Mulch.

As a result of observations made over a lengthy period and a wide range of soils in different parts of Australia, it is considered that from 2½ to 3 inches is the most economical depth of mulch. Anything shallower would not prove effective, and a greater depth would be too costly in proportion to any extra benefit accruing. These recommended depths also provide a firm, moist soil just under the seed when planting is done; that will ensure a quick germination, which is always a desirable objective.

Little difficulty is experienced in retaining the desired mulch on the ''self-mulching'' soils from which the bulk of the wheat crop is at present produced.

Varieties to Sow.

Owing to mutations, inter-crossing, and environmental changes, the wheat plant has become very complex in character, and to-day thousands of varieties are grown commercially throughout the world, each with just that difference which makes it preferable to the rest for the conditions existing where it is desired to propagate that particular variety.

There are countries like Canada where the bulk of the grain grown is confined to only a very few varieties. This is rendered possible by the similarity of climate and soil throughout the region of production. In Australia the reverse is the case, for here a great variety of soils and an equal diversity of climate are characteristic of the wheatgrowing areas. The climatic and physical features of the Queensland wheat-growing regions have resulted in an expansion of the industry in a latitudinal rather than in a longitudinal direction, as is the case with the Dominion just cited. In view of this, it has been necessary to evolve or obtain varieties suited to the varying conditions, which are possibly of wider range in this State than in any other in Australia. Fortunately, the grower of to-day is much better off than the wheat farmer of some years ago, for the knowledge which he possesses of the requirements and merits of a variety or varieties enables him to select the best for his particular set of conditions. Ultimate success depends largely on a wise choice of varieties sown at the right season. No matter what time and skill have been successfully expended on the preparation of the seed-bed, the whole of that work can be rendered more or less valueless by selecting unsuitable varieties or by sowing out of season.

Plate 220.
BUNGE No. 1.

Many of the new wheats introduced to or evolved in Queensland, which have come into general cultivation, are earlier in habit than their predecessors. This is due to the fact that the characteristic mentioned enables them to escape rust to some extent in seasons when it is prevalent, and in years of limited rainfall they produce grain under conditions fatal to slow-maturing varieties. This earliness, however, in conjunction with unseasonable sowing, is also a contributing factor to losses due to late frosts. Many growers interpret wrongly the terms "early" and "late" as applied to wheat. These expressions are used in relation to

Plate 221.
CEDRIC.

maturity, and not to sowing. A late wheat is one to be sown early; an early variety one to be sown late; and a medium late for sowing medium early. It would probably be far better if the terms "quick" and "slow" were adopted instead.

A brief description of the varieties recommended, with their season of maturity and the soils whereon and the districts wherein it is considered they can be grown satisfactorily, is given in the following paragraphs.

Plate 222.
CURRAWA.

Bunge No. 1.—A selection (Plate 220) made at the Hermitage State Farm, Queensland, which was, for some years, first favourite in the Maranoa for hay and grain. It is a medium early, tall, sparse-stooling variety, rust-escaping, but susceptible to bunt. Grain medium large, of fairly good milling quality, stores well, although inclined to deteriorate rapidly if wet conditions are experienced after ripening. Suitable for sowing on all classes of soil ranging from medium-heavy to sandy in any of the wheatgrowing districts.

Cleveland.—An introduced, slow-maturing variety from New South Wales, and, therefore, suitable for early sowing; grown extensively for green feed and grazing on the Eastern Downs, more particularly on the heavy black soils in the Pittsworth district. It is a vigorous grower and a good stooler, with a straw inclined to be stout; ears medium size, tapering, with white chaff. Fair rust-resister, and not very susceptible to bunt. Grain medium strong, white, plump, of medium size. Recommended for growing on the heavy and loamy soils in the cooler wheat-growing regions.

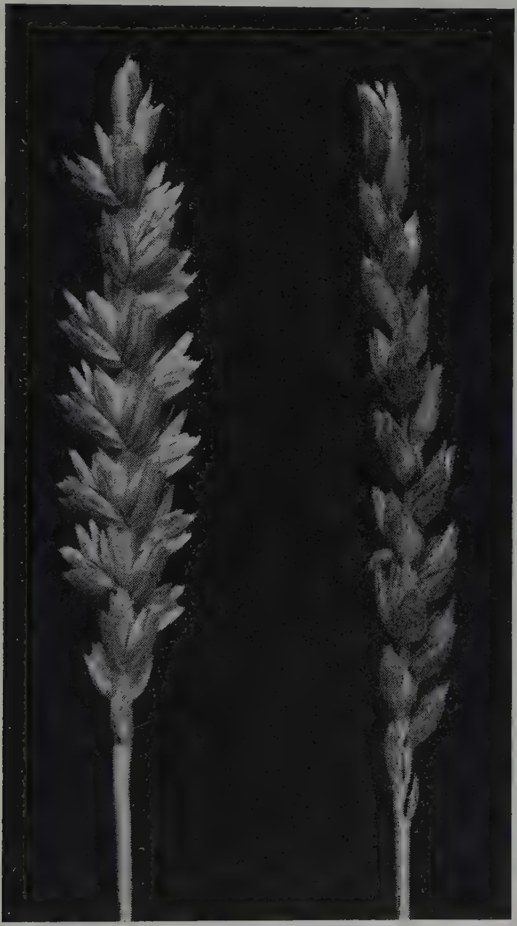

Plate 223.
PUORA.

Cedric.—A Queensland variety (Plate 221) resulting from the crossing of Bunge No. 1 and Cedar, a New South Wales variety. Cedric is a mid-season, medium-stooling, tall-growing wheat with a willowy straw. Head bald, medium long, tapering, drooping slightly, with creamy-white chaff. Grain medium large, red, with good milling and storing qualities. Fairly rust-resistant, but susceptible to bunt. Suitable for growing on medium heavy soils, loams, and sandy loams throughout the wheat belt.

Currawa.—A slow Victorian variety (Plate 222) which must therefore be sown early to ensure success. It is grown extensively on all classes of soil on the Downs as a dual-purpose crop—i.e., for grazing and grain, for which it excels easily all other varieties, providing as it does, under favourable conditions, plenty of feed; after which, if permitted, it will very often return a heavy yield of grain. For grazing purposes, it is sown, if conditions are favourable, in March. It tillers remarkably well and has a rather coarse, hollow straw. Ear clubbed, medium length, broad, with few tip awns. Grain yellow and opaque, is not favoured by millers; fairly rust-resisting. Suitable for sowing in

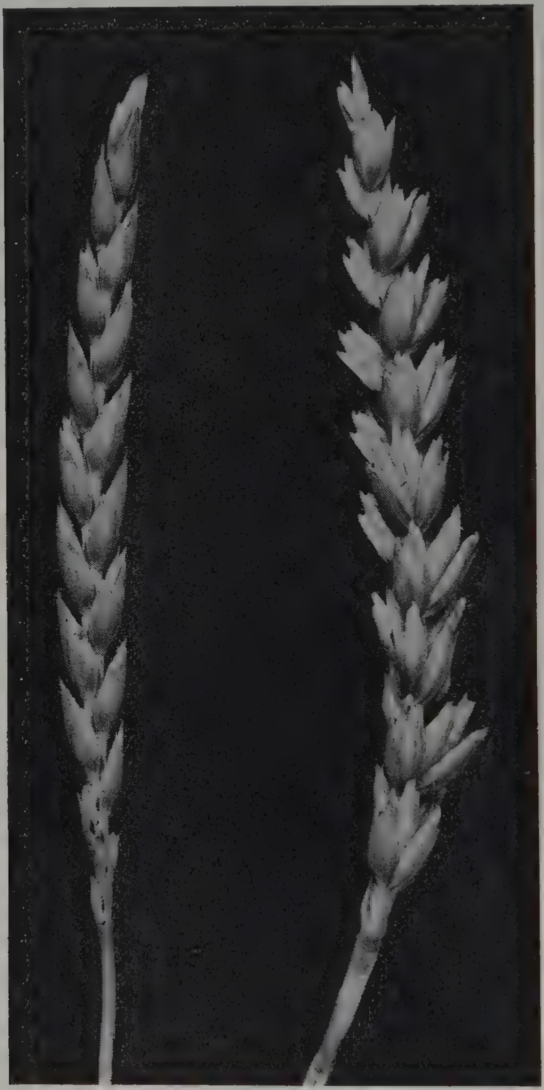

Plate 224.
WARPUT.

those districts with the longest season and most generous rainfall. It is not recommended solely for grain production, however, as, owing to the quality, it is subject to dockage by the Wheat Board.

Florence.—Produced in New South Wales in an effort to evolve a bunt-resistant variety. How successful the effort was may be gathered from the fact that in the susceptibility trials in Queensland in which it was included for some years, it did not on any occasion show infection; whereas the varieties infected from the same source showed up to 70 per cent. Florence has long been a favourite with growers for late sowing in low-lying locations where there is a danger of late frosts. Fair stooler, with straw of medium height and fineness. Ear tip awned, white chaff and open glumes. Grain of good milling quality, which is inclined to shell out. Suitable for hay as well as grain.

Plate 225.
GLUYAS.

Ford.—A New South Wales variety (Plate 226) produced as a result of crossing Fancy with Crossbred 53. Suitable for hay or grain.

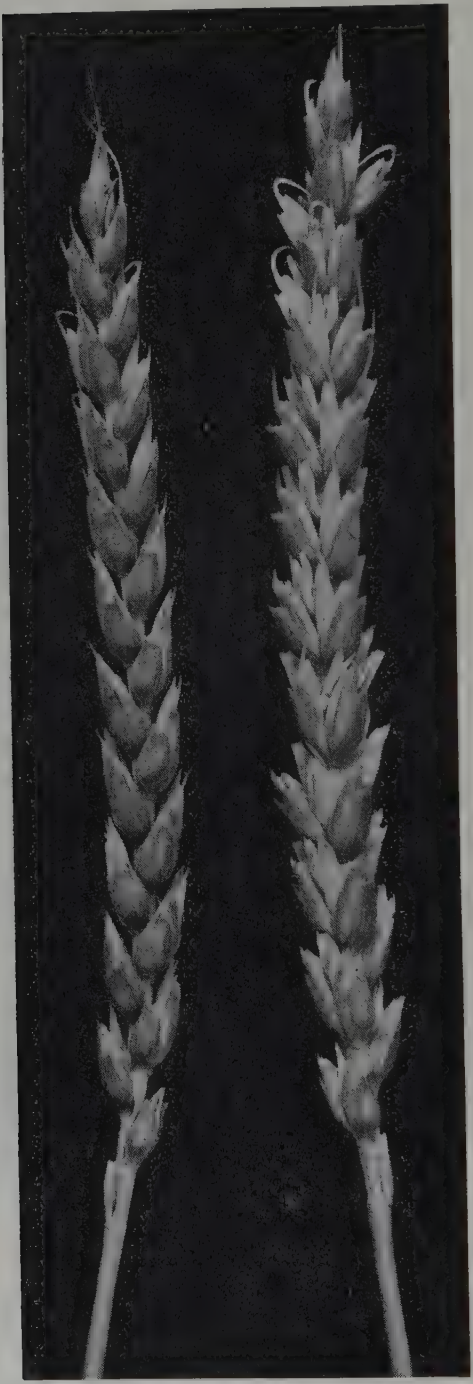

Plate 226.
FORD.

Medium late. Good stooler, tall, yellow-strawed variety. Ear long, tapering prolific, with few terminal awns, chaff creamy smooth. Good dry-weather wheat when sown early, with some resistance to rust. Grain large, yellowish, of medium strength. Appears to be a promising variety for medium early sowing over a wide range of districts.

Puora.—A Queensland variety (Plate 223) produced as a result of crossing Pusa and Flora. Grain only. Mid-season, medium tall, erect, yellow-strawed, fair stooling wheat. Ear of medium length and flattened. Creamy smooth chaff well filled. Grain medium size, hard, translucent, of medium strength. Good dry-weather wheat, with slight rust-resistance. This appears to be an excellent variety for the main crop sowing over a wide range of soil types throughout the Downs.

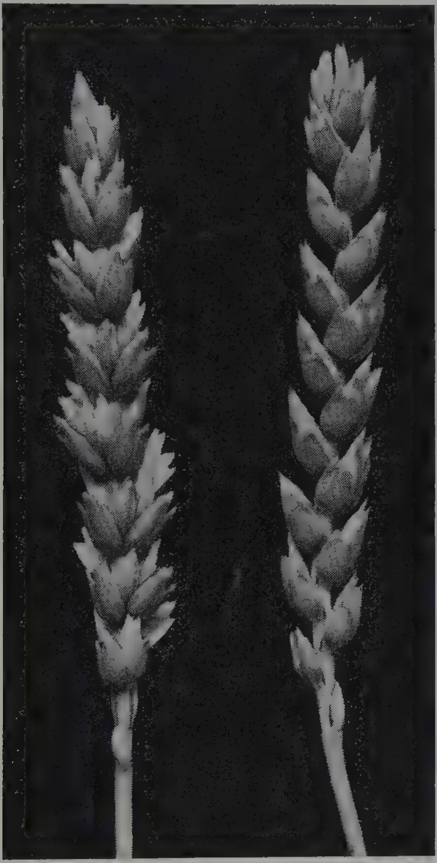

Plate 227.
FLORA.

Warput.—A Queensland variety (Plate 224) produced as a result of crossing Pusa and Warren. Suitable for green feed, hay, or grain. Medium late, good stooling, tall, erect, yellow-strawed variety. Ear long, tapering, smooth creamy chaff. Grain medium large, medium soft, of medium strength. Slightly earlier-maturing than Ford, but generally suitable for same localities as that variety.

Gluyas.—Selected originally from a crop of Ward's Prolific wheat at Telowie, South Australia. Has been a firm favourite in Queensland for over a quarter of a century. Its liability to lodge under adverse weather conditions caused the area devoted to it to recede, more particularly in those districts where the stripper was used to harvest the crop. With the coming of the header-harvester, with which it is possible to harvest badly-laid crops with little loss and extra cost, the area under it (Plate 234) has increased again. It is pointed out, however, that the gluten quality of this variety is so low that it is used as the minimum allowable standard in the selection of new creations in the breeding operations.

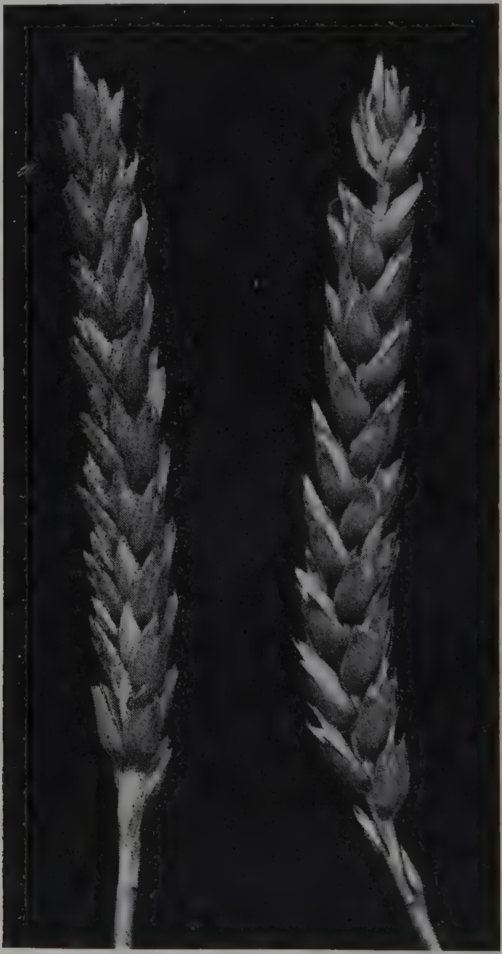

Plate 228.
Novo.

Flora.—A mid-season, erect, fair-stooling variety (Plate 227) of medium height, which has come into favour. The ear is bald, of medium size, with white smooth chaff. Shotty grain, medium size, of pleasing appearance, of medium strong class. Fairly drought-resistant, but susceptible to rust. A Queensland production, the result of crossing

Bobs with Florence. A universally-grown variety, but is particularly suitable for the heavier Downs soils. In 1937 a greater acreage of Flora was grown in Queensland than any other variety.

Novo.—A Queensland variety (Plate 228) produced by crossing Bunge No. 1 with Indian Pearl. A medium quick variety, ear short and compact, glumes hooked, willowy, medium length straw, good stooler.

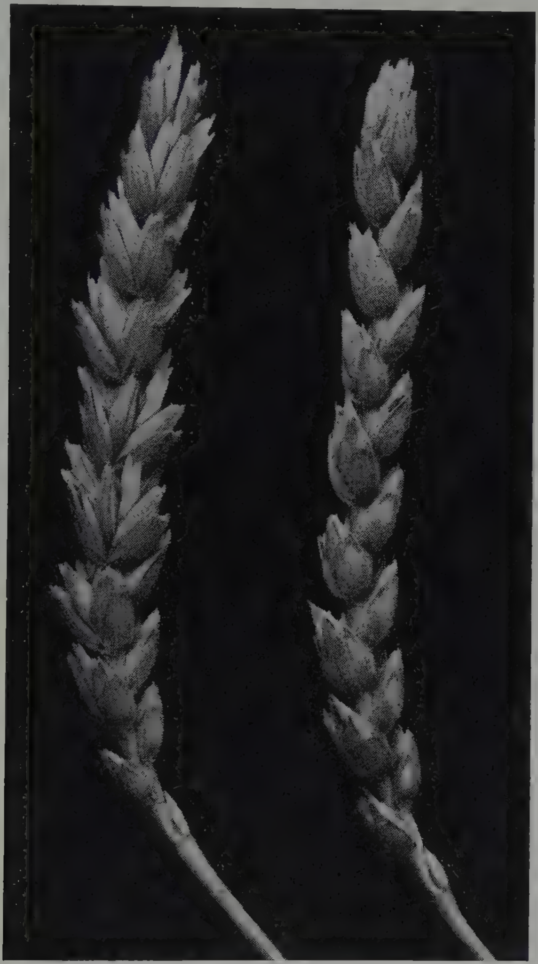

Plate 229.
PUSA.

Grain medium large, hard, tapered, translucent. Fairly drought-resistant, but susceptible to rust and bunt. Is grown most successfully on the light loams.

Pusa.—This variety (Plate 229) was introduced to Queensland from Pusa, India, many years ago. A quick, medium tall variety, erect, ear medium length, brownish pubescent glumes, bald, tapering. Although susceptible to frost, it generally escapes rust in normal seasons. Grain hard, translucent, of strong class. It has proved to be one of the best quality wheats in general cultivation throughout the State.

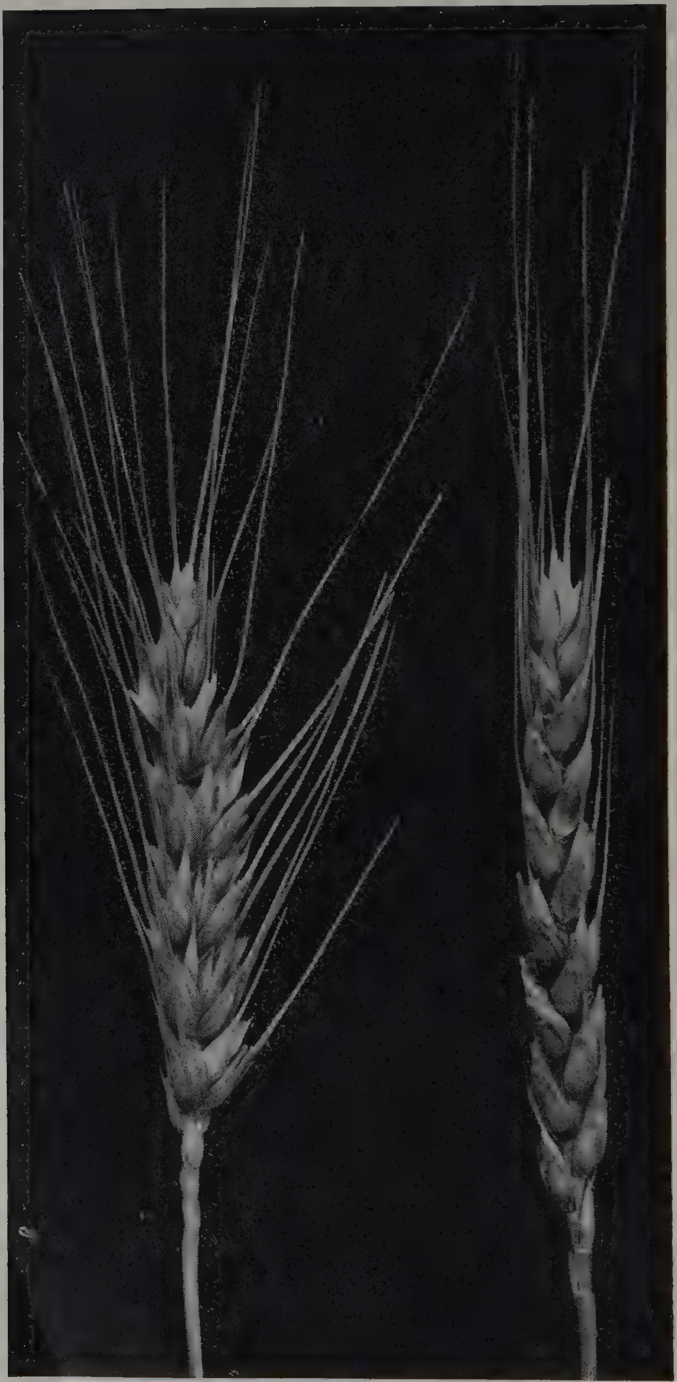

Plate 230.
THREE SEAS.

Seafoam.—A Queensland variety, being a selection from Three Seas. A quick, medium, tall, bearded variety; white, smooth chaff. Stools fairly well. Rust-resistant, but susceptible to frost and bunt. Good dry-season variety, prolific. Grain medium soft, of the medium strong class. A promising wheat for the medium to medium heavy soils of the Downs.

Plate 231.
WARCHIEF.

Three Seas.—Of Queensland origin, being the result of back-crossing Comeback x Cretan with Comeback. A variety (Plate 230) which has come into favour for late sowing, especially on the Downs soils, on account of its rust-resistance. A medium, short-strawed, white, smooth-chaffed, bearded wheat; medium quick and prolific yielder; susceptible to frost. Grain large, medium soft, of the medium strong class.

Warchief.—Mid-season Queensland variety (Plate 231), tall, good stooler, ear medium long, bald, tapering, white-chaffed; fairly resistant to leaf rust and bunt, but susceptible to loose smut. Suitable for hay or grain, although a weakness in the straw is sometimes noticeable on rich soils in a good season. Grain white, flat on crease side, belongs to the weak class. Mostly grown in the Downs area.

Warren.—A New South Wales variety. This is an old, well-tried wheat, mid-season to slow, good stooler, medium tall, with bald, white, tapering ear. Grain, which belongs to the weak flour class, is of fair size and appearance. Is susceptible to bunt and loose smut, but fairly rust-resistant. Can be grown for hay or grain, although in good seasons on strong soils the straw is inclined to become weak.

SEED.

Having decided upon the varieties to sow, the farmer should procure his seed from some reliable source, with a guarantee that it is true to name, of the required standard, free from disease, and graded; otherwise, he may be supplied with either an unsuitable variety or with grain that is low in vitality; or it may be infected with disease, with a resultant contamination of his fields, while weeds may be introduced which will give no end of trouble.

A grower should never discard a variety which has served him well over a period of years in favour of another recommended to him, or about which he has read glowing accounts, until he has thoroughly tested it as to its suitability for the local conditions.

A grower using his own seed should be sure that it comes up to standard and that it is free from disease and foreign seeds. Purity is another important matter, and in this connection the grower is reminded that it is next to impossible, with the complicated machinery in present-day use, to obtain access to all the holes and corners which provide lodgment for grain. Therefore, the only course to pursue is to clean the machine as thoroughly as possible before commencing operations on a variety of which it is intended to save the seed and then reserve the requisite quantity from the last harvested.

Before planting, all seed should be graded, by which means weed seeds, cracked and small grains, and foreign matter are removed, and a more regular rate of seeding, better germination, and more robust seedlings are obtained.

Seed Treatment.

The treatment of seed for the prevention of bunt is still essential, more particularly if seed is procured from an unknown source and if freedom from disease cannot be guaranteed.

Dry powder treatment is now commonly employed, since it is less cumbersome than the wet methods once universally used. The powders, of which there are many on the market, are either copper or mercurial compounds; the rate of application is generally 2 oz. to the bushel.

The powder may be applied to the grain by home-made picklers, of which the one illustrated (Plate 232) is an example, or by machines which are available on the market at a reasonable price. Again, in some districts there are travelling outfits which grade and treat the seed at the same time. Whatever appliances are used, they should result in the seed being thoroughly coated with dust.

As the treatment with copper carbonate does not impair the vitality of the seed, even when stored for twelve months, it should be done as soon after harvesting as is practicable. This is particularly desirable if the grain is weathered or is of softer varieties such as Three Seas and Seafoam, for such grain is susceptible to weevil infestation. Prolonged keeping of seed treated with mercury dusts, however, should be avoided, as some reduction in germination may occur if storage extends over several months. Though the dusts will not destroy weevils actually in the grain, they will afford it protection if not already infested.

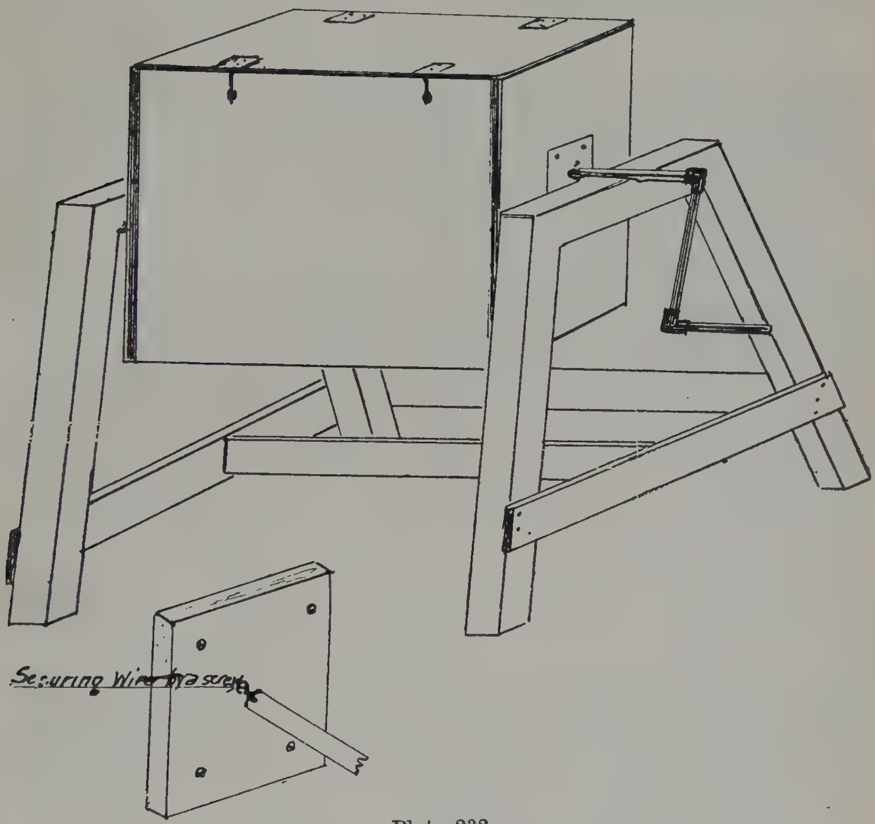

Plate 232.
The Petrol Case Wheat Seed Pickler.

All dusts are harmful if inhaled; therefore, precautions should be taken to cover the mouth and nostrils with a cloth or handkerchief, though a dust mask, such as is used in a flour mill, which can be worn with less discomfort, can be purchased cheaply. Surplus dusted grain, especially if treated with one of the mercury dusts, should not be fed to stock or fowls. The mercury dusts are, of course, particularly poisonous.

Storage of Seed.

Wheat seed is generally stored in bags either in a closed barn or outside on a raised platform, but, wherever it is stored, the utmost care should be taken to make it secure from the attacks of rodents and other vermin, and to see that it is not directly exposed to inclemencies of the weather; otherwise, when required, it may be found to be worthless. In the event of weevils making their appearance, which is quite probable if the harvest was a wet one, it will be necessary to fumigate the seed with carbon bisulphide.

SOWING.

Grain drilled in has a far better chance of germinating satisfactorily than grain sown broadcast, for it can be placed in the soil at the desired depth and it is protected from predatory birds and animals through being well covered. Drilling where the soil is in a favourable condition not only ensures germination, but also results in a saving of 50 per cent. of seed as compared with broadcasting.

Two types of drill are at present in general use—the disc and the cultivator-drill; although the former is the older and more widely distributed, the latter is fast superseding it. Being practically two implements in one, it is possible with the cultivator type to give the final working and to sow the seed at one operation with the soil in a favourable condition to ensure good germination. The cultivator-drill, with its variety of teeth, has been a great boon to wheatgrowers and has filled a long-felt want, especially on holdings where the soils are of a clayey nature and are inclined to run together after rain; it is also a very valuable implement when fields have become foul with winter weed seeds. On soils which tend to cake and bake after rain, a grower working a cultivator-drill can afford to wait until enough rain has fallen to make it sufficiently moist to bring about germination, before sowing. On such soil types, if sown dry, there is always a likelihood of the surface setting to a hard crust, tight enough to prevent the young wheat from breaking through the surface, more especially if only pinched seed has been available for sowing. On weedy soils, as on all others, sowing after rain with a cultivator-drill means also a final cultivation which restores the mulch and ensures the destruction of innumerable germinating weed seeds. Furthermore, if the following rains are long delayed, the young wheat plants can still become well established and so able to compete successfully with any later weed growth.

With the removal of the grain tubes and attachments, the cultivator-drill can be used continually as a spring-toothed or rigid tine cultivator for the summer working of fallows.

Both the disc and cultivator-drill can also be utilised for the sowing of seeds from the size of linseed to peas, and can be purchased with a fertilizer attachment capable of distributing any kind of commercial fertilizer.

Though not advocated as a general practice, it is sometimes advisable to sow dry where it is the intention to have a large acreage and the main sowing period has passed. The justification for doing so is that there is always a possibility, when the weather does break, that it will continue to be showery and it might be weeks before the sodden condition of the field permits the completion of sowing. Of course, the soil wherein the seed is placed must be sufficiently dry not to induce sprouting.

A word of warning must be given at this juncture. Grain left in drills overnight and in drills driven from one field to another is liable to consolidate to such an extent that when the implement is thrown into gear and started up so much strain is thrown on it that a serious breakdown may be the result. More particularly does this apply to grain which has been treated with dry powder for disease control Such a happening can be avoided by giving the grain shaft a turn or two backwards and forwards with the testing handle before starting the machine again on its work.

Depth of Sowing.

The depth of sowing is controlled by many factors, the chief of which are the type of soil, the condition of the surface, the moisture content, and the season; from 2 to 2¼ inches, however, is considered to be the most favourable depth at which to sow.

Occasionally on light soils grain is planted deeper to ensure germination, while on clayey soils, which set down hard, many seedlings would fail to reach the surface if sown 2¼ inches deep should heavy rain fall immediately after the seeding. Evaporation becomes slow and germination is tardy as the season advances; so the depth of sowing should then be reduced sufficiently to ensure that the seed is buried just deep enough to be protected from birds and other animal pests.

Rate of Sowing.

The amount of seed to sow per acre is governed by the size of the grain, the condition of the seed, the variety, and the time of sowing. As a general rule, however, 30-35 lb. per acre will suffice in the Maranoa for early and mid-season planting—i.e., from April to the third week in May; whereas on the Downs 40-45 lb. are necessary. On areas sown later in the former district 40-45 lb. is recommended; whereas on the Downs 50-60 lb. are planted.

Weathered grain and that treated for the prevention of disease will not run as freely as a nice, bright sample of untreated seed; consequently, it is advisable, before commencing sowing operations, to weigh out a few pounds of the grain to be sown, and put it in the drill, the grain then being sown and the area covered by it calculated. From this calculation the machine can be set to sow at the desired rate.

Weathered or other grain about the vitality of which there is even the slightest doubt should be submitted to a germination test so that the correct rate of seeding may be determined.

Direction of Sowing.

With the disc drill it is desirable, if at all possible, to plant at right angles to the last working to ensure that all the seed is well covered and germinates evenly; otherwise, where the drill travels in the same direction as, say, a plough finish, some of the seed is only just covered, and in some instances even left lying on the surface, with the result that it does not germinate until later than the bulk of the sowing, thus resulting in uneven ripening. With the cultivator-drill there is no necessity for such a procedure and, if the field is level, it can be sown round and round. In the event of the field being on a slope, it is, however, advisable to follow the level contour in the same manner when drilling as when ploughing This will enable the rows of plants to retard the run-off of storm waters and thus obtain a greater penetration of moisture, with a consequent beneficial effect on the crop and a marked reduction in soil loss.

HARROWING THE CROP.

On responsive soils harrowing a wheat crop results in a loosening of the surface, thereby reducing evaporation and creating the best conditions for the reception of further moisture should rain fall. It also destroys weed seedlings, and induces deeper rooting and possibly increased tillering. Many farmers are not in favour, however, of harrowing the young wheat crop, and such is not recommended for soils inclined to bake and run together.

Should stubble conservation, which is now being adopted in parts of the United States of America and also in New South Wales, be taken up by farmers in Queensland in order to combat soil erosion, then in such cases harrowing should not be attempted

Harrowing can generally be carried out with safety on suitable soils as soon as the young plants have become firmly established, and may be repeated after each rain, up to the time the crop covers the ground. Where harrowing can be done, the operation should be across the drilling in order to secure the best results and to reduce injury to the plants to a minimum Harrowing across the drills is not practicable for the entire field where a crop has been drilled in by going round and round the paddock and finishing in the centre, which is the general practice nowadays In such instances it is advisable to harrow across the direction of the longest rows. Close examination should always be made of the effect of the operation to decide whether more damage than good is being done It is imperative to keep the harrow teeth free of soil and trash; otherwise serious damage will result.

HARVESTING MACHINERY.

In recent years there has been an all-round improvement in the machinery (Plates 233 and 234) employed in the wheat industry, which has raised it from a state of drudgery prevailing when horses were employed to a high plane of efficiency. With modern machinery and implements, wheat-farming has become a highly organised industry—a matter of mechanics as well as agriculture. So far as Queensland is concerned, the most important mechanical advance has been made in connection with the harvesting branch of the industry.

The fact that the advent of the stormy season in this State coincides with the harvesting of the crop made this period a worrying one to growers when the non-cutting types of harvesters were in vogue. It was the chief retarding factor in the development of the industry, for, though cultural methods could be employed to minimise, to a certain extent, the ill-effects resulting from droughty conditions, nothing could be done to ward off or minimise the damage likely to be occasioned by a storm. All too frequently, seasons occurred when good crops were flattened and wholly or partly lost because of the fact that the machines were unable to handle them effectively.

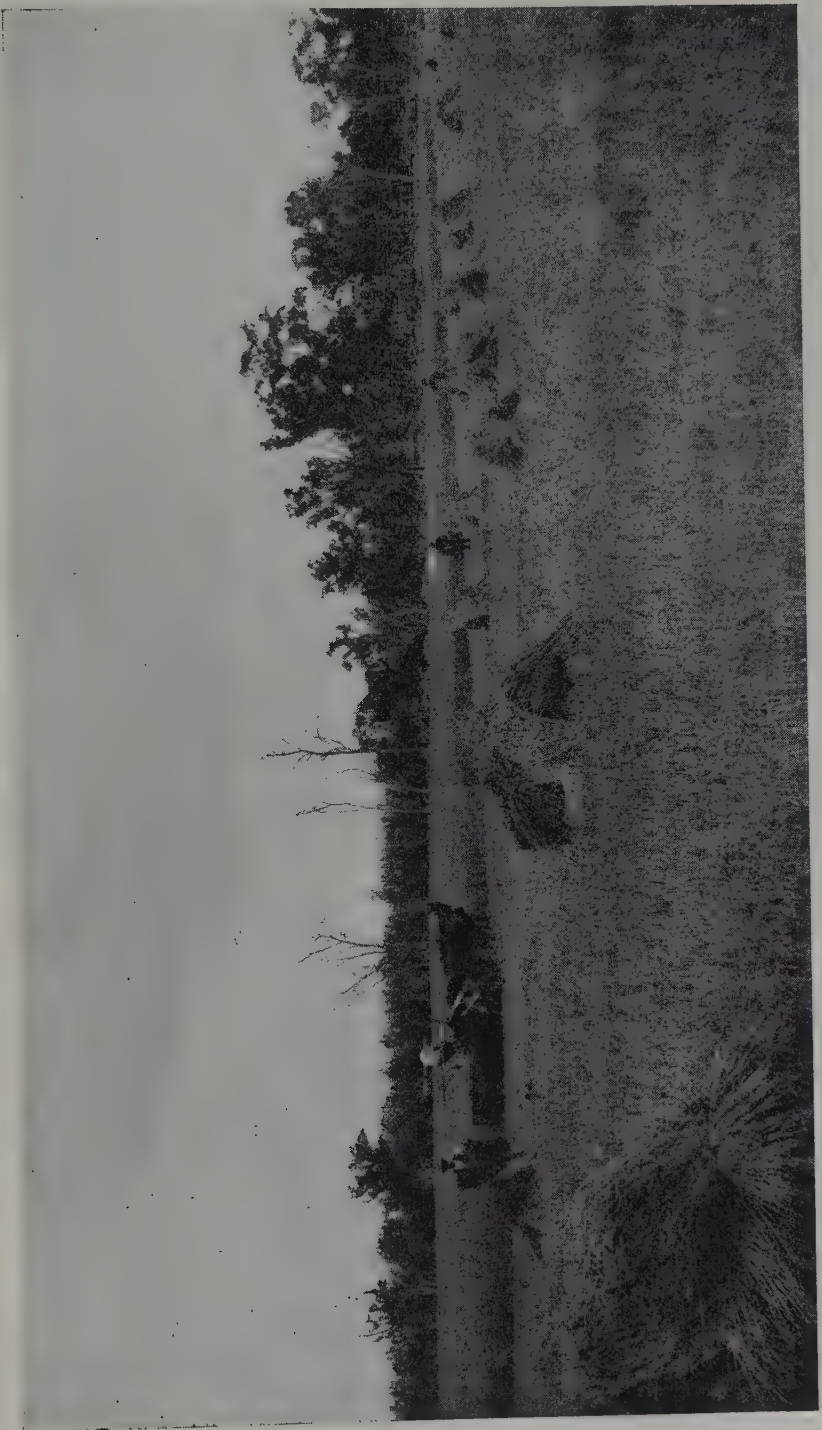

Plate 233.

HARVESTING WHEAT WITH THE BINDER.—This method is now mostly confined to the small farms. The binder is the most suitable machine, however, for cutting cereals for hay.

With the advent of the header-harvester this condition of affairs ceased, for it is possible with this type of machine to garner expeditiously and with comparatively little loss the grain of storm-flattened and weedy crops. There are many makes of machines on the market suitable for Queensland conditions.

Drawn by tractors or horses, the machines gather, cut and thresh, and clean the grain in one operation. Crop-lifters for crops that have been flattened by storms can be readily attached. Chaff-savers can also be obtained. With some makes it is also possible to successfully handle such crops as peas, lucerne, linseed, sorghum, and canary seed in addition to harvesting the wheat. Machines are now fitted with a power take-off, the extra cost of which will be recovered in a season of heavy yields or storm-tossed crops through the saving in time and grain. There are also engine-functioned header-harvesters in which horses are used for draught purposes, these constituting a particularly useful type on hillsides and sandy or loose ground.

PURCHASE OF PLANT.

There are many types of cultivating, sowing, and harvesting machines specially built for the varying conditions and soils found in the different parts of Australia which are employed successfully and all of which have their advocates. For this reason, it behoves a prospective grower, and one going from one district to another before making any purchases, to seek the advice of those men who have been successful in the locality and obtain the information which will enable him to make a sound selection of the plant he will require to work his holding profitably.

HARVESTING.

As the advent of the stormy season synchronises with the harvesting period, it is essential that as little time as possible be lost in removing the crop after it is ready for the machines. The crop (Plate 233) is fit for harvesting when the grain has become hard; this can be ascertained by biting or cutting with a knife. Should a crop have ripened unevenly, the grain tested should, of course, be taken from the last patch to ripen. Ripe grain which has lost its hardness through the incidence of showery weather should be allowed to harden up again before harvesting.

The one undesirable feature about the header-harvester is its ability to take crops off when they are not really in a fit condition for harvesting because of the grain being unripe or damp. When an attempt was made to harvest such crops with machines which stripped, the amount of choking which took place indicated that the crop was not fit to harvest and caused a cessation of operations. To harvest grain out of condition does not save time, for it has to be spread out, dried, and rebagged; otherwise a total loss may result. Damp wheat will not be accepted by the Wheat Board's classifiers on any consideration. Wheat even only very slightly damp is susceptible to weevil attack.

CARE OF MACHINERY AND IMPLEMENTS.

When machinery and implements are purchased nowadays, instructions generally accompany them, and these should be followed to the letter, more particularly in regard to fuel and lubrication. The lives of machinery and implements are more frequently shortened through incorrect lubrication, or absence thereof, than through any other cause.

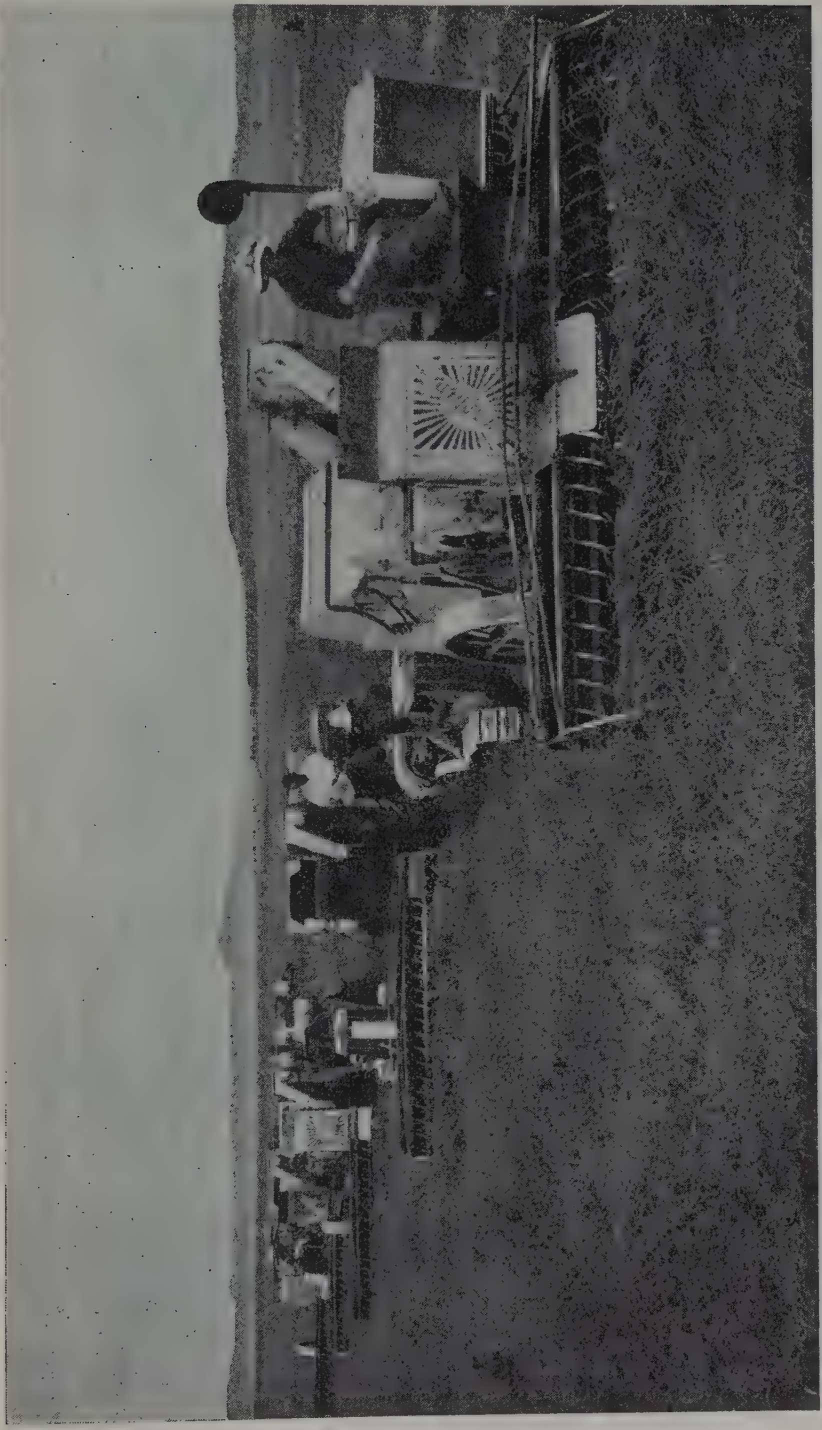

Plate 234.

Harvesting Wheat, Evanslea, South Queensland—Note the lodged condition of the crop.

Plate 235.

Ready for the Bag Sewers in a Wheat Field near Bongeen, South Queensland.

If possible, all machinery and implements should be kept under cover when not in use, and it is imperative that they be painted and repainted as required, especially the wooden parts.

On the completion of harvesting, or, in fact, of any of the major operations, machinery and implements, before being put away, should be thoroughly overhauled for worn, cracked, or broken parts, and the required duplicates ordered so that they can be used to replace those defective parts when a slack or wet period occurs.

By adopting this procedure, delays occasioned by breakdowns can be reduced to a minimum.

FERTILIZING.

In South and Western Australia the wheat industry is almost wholly dependent upon an adequate supply of cheap phosphatic fertilizer; whereas in Queensland, because of the high natural fertility of the soil and the comparatively short period during which the wheat lands have been cropped, the application of fertilizer is not practised to any extent. There are, nevertheless, definite indications that a movement in this direction is taking place here also, and many areas of lighter soil which have been cropped for some years will, without doubt, respond well to an application of half a hundredweight of superphosphate per acre.

Comprehensive Queensland trials extending over a period of more than twenty years showed that on loamy soils the increase in yield due to the application of half a hundredweight of superphosphate per acre was little more than sufficient to defray the extra cost incurred. Notwithstanding this, land should not be cropped until it becomes unprofitable before fertilizer is applied; otherwise it may prove a long and costly process to restore its original productivity. It is much easier to retain than to regain fertility.

Analyses of soils from the wheat areas of the State have shown generally that there are ample nutrients such as nitrogen and potash to meet the requirements of a wheat crop in a normal season. Fertilizer trials have usually verified these findings, and it is not believed that fertilizing other than with superphosphate will be of any possible economic benefit for the average wheatgrowing soil.

Where lamb-raising is being practised, the residual effects of fertilizers are of considerable benefit, so that their value cannot be based wholly on the return obtained in grain alone.

REDUCING FIRE RISKS.

Though the harvested grain itself, through the operations of the Wheat Board, is automatically insured against loss by fire, cover in respect to this danger does not extend to the standing crop. The premium required by companies transacting this class of business is high and beyond the reach of most growers.

The danger of a crop being destroyed by bush or grass fires getting out of control, through being struck by lighting in a dry storm, or by the careless use of matches is ever present, and, furthermore, the risk has not been reduced by the introduction of tractors; hence it is necessary, in his own interests, for every grower to take the precaution to ensure that, in the event of an outbreak of fire occurring, it will be localised.

Except under abnormal conditions, protection can be afforded to a field by cutting a strip half a chain in width all round the field, with a reaper and binder for preference, when the crop is in the best condition for hay, and then ploughing or sunder-cutting the stubble. Where large areas are sown, the same procedure should be adopted, but, in addition, half-chain tracks should be cut through the crop in such a manner as to divide it into 100 or 200-acre blocks.

In the event of its being known prior to sowing that there will not be a machine available to cut the roadway, strips can be left unsown or, failing this, after the crop has come up the young plants can be destroyed by cultivation, the necessary breaks being thus formed.

HAY.

Wheat ranks next to lucerne in importance as a hay crop in this State, although for every acre of the former there are ten of the latter. The preparation of the land for a crop intended for hay is similar to that for a grain crop, but it should be sown two to three weeks earlier with a variety specially suited for making hay.

The time at which to cut the crop is very often governed by circumstances beyond the farmer's control, but, in order to obtain the best feeding material, it should be not later than eight days after flowering. Many like to see the grain well formed in the chaff, but at this stage the chaff is more indigestible, while, in addition, the presence of grain in the material is inviting destruction by mice or other vermin unless proper storage facilities have been provided.

The most suitable, and, in fact, the only, method recommended for harvesting is with the reaper and binder. Cut by this means and well stooked, the hay will stand a great deal of weather, provided that a couple of days elapse between the stooking and the occurrence of rain; by that time the sheaves will have settled into position and, in a measure, become weatherproof.

Whether the stooks made are of the round or long narrow type is a matter for the individual farmer, although the latter type is considered to be preferable in the wetter districts.

No hard and fast rule can be laid down as to how long the hay should remain in the stook, as this is governed by the condition of the crop when cut and by the ensuing weather. As soon as it is sufficiently cured it should be carted in to avoid deterioration through wet weather or other causes. One of the most reliable methods of determining whether the material is cured sufficiently to be carted in to the stack or shed is to pull out a handful of straw from a middle sheaf in, say, half a dozen stooks situated in different parts of the field. If, on examination, the upper nodes are found to be shrunken or dried, carting can be gone on with, for it must be remembered that drying is going on the whole time the crop is in the field; also, if it becomes too dry before stacking, it will not make good hay.

If there is any doubt as to whether the hay was sufficiently dry or not when carted in, the simplest method is to push a fork handle or an iron bar into the middle of the stack and leave it there for a few minutes. A touch of the hand on the bar, when withdrawn, will indicate whether the hay is heating up too much or not. If it is only just warm, it is as required; if hot, it will require to be tried every day and watched carefully, if very hot, the stack will have to be opened to prevent the material from becoming charred, or spontaneous combustion occurring.

THE WILD OAT PEST.

The wild oat* has been known to infest wheatfields from time immemorial and is found throughout the cereal-growing countries of the world, being as adaptable as wheat to varying conditions. Its importance as a pest varies according to the extent of infestation, which is determined largely by climatic conditions and the cultural methods in vogue in any particular country.

Not only does the wild oat compete successfully with wheat for plant food, but it necessitates extra cultivation, causing loss of soil moisture and the deferring of sowing until late in the season. The risk of loss through drought, storms, or rust is thereby seriously increased. Some success in controlling the wild oat has been obtained in the drier districts by sowing medium to long season varieties of wheat early in April. The early establishment of the wheat plants enables them to develop sufficiently to compete with the later germinating wild oat to such an extent as to suppress the latter's growth.

In some seasons the climatic conditions may delay the germination of the wild oat, and in such circumstances the seed of that plant may be green when the wheat is ready for harvesting. If the wheat is then harvested, the inclusion of the green wild oat seed in a bag of grain may cause heating, with a resultant impairment of the quality of the wheat. If, on the other hand, the crop is permitted to remain until the wild oats are ripe, unfavourable weather may ensue and cause loss through the bleaching and sprouting of the wheat.

With the wild oat, as with other vegetable pests, prevention is better than cure; therefore the greatest care should be exercised in seeing that clean and new areas are not infested through the entry of wild oats with seed wheat or horse-feed.

The chief difficulties encountered in the work of wild oat eradication are due to peculiarities associated with the seed, in conjunction with the fact that the soil, in a heavily-infested field, contains wild oat seed from the surface to the maximum depth to which it has been worked.

The peculiarities of the wild oat seed are the hard, heavy protective covering of the germ and the fact that it normally germinates at a lower temperature than other cereals. This means that, in order to start into growth, it must lie in close contact with the soil at the correct temperature for a much longer period than is essential to promote germination of a grain of wheat. The wild oat has a shorter growing period than wheat, and, even although it does not commence growth till some time after the wheat has germinated, it nevertheless normally matures and scatters its seed before the wheat crop is ready to harvest. It is thus a very difficult matter to eradicate the wild oat from an infested wheat paddock, and it is evident that any system devised for its eradication will result in missing one wheat crop, except in cases where the long-fallow system is practised for, in the latter event, the crop is grown in alternate seasons only.

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* *Avena fatua.*

Where the land has become heavily infested with the wild oat, the following procedure in connection with its eradication can be practised where the long-fallow system is in vogue, and will be found more lasting in its effects than growing hay crops for a couple of years or keeping the field out of cultivation for a similar period.

All operations should be planned to produce the optimum conditions for the germination of the wild oat seed, which means that the soil must be brought to as fine a tilth as possible so that when rain does fall, and the soil temperature is right, the bulk of the seed will start into growth. After this has taken place, the land should be ploughed to the maximum depth to which it is intended to go for the next crop of wheat, and should then be harrowed. All subsequent growth of wild oat seedlings should be dealt with by cultivating to a depth of not more than 3 inches, which should, in every instance, be followed by a harrowing in order to retain the desired tilth. Rolling after harrowing has been recommended, for the reason that the seeds will not germinate in the loosely-packed soil because of its drying out too quickly. Rolling would doubtless prove beneficial on ''self-mulching'' soils, but the consolidating action of the tractors or horses when passing to and fro should prove sufficient on soils that are inclined to run together. Obviously, the operations discussed in this paragraph will have to be carried out during the cooler months of the year, when the conditions are favourable to the germination of the wild oat.

MARKETING WHEAT.

Progress in the industry in Queensland has not been confined to production methods, but has also extended to the marketing of the crop. For that purpose the Queensland State Wheat Board was established in 1921, with a compulsory pool.

Primarily, the Board was constituted for the purpose of putting growers in a position to control and regulate the marketing of the 1920-21 season's then bumper crop, which amounted to three and three-quarter million bushels. On several occasions since then a ballot has been conducted on the question of the extension of the Board's existence, and on each occasion there has been a large majority in favour of continuance.

In addition to its marketing activities, the Board conducts a co-operative hail insurance scheme, under which all the wheat grown in Queensland is automatically insured against hail damage from the time of coming into ear until it is harvested. The premium is payable only on the actual quantity harvested.

All wheat is insured against fire, and cover under this heading extends from the time it is bagged until it is disposed of by the Board, or, in the case of seed or feed wheat retained on the farm or purchased from the Board, until it has been sown or consumed as the case may be.

The price of wheat is fixed daily, and Darling Harbour rates are a controlling factor.

As the wheat pool is a compulsory one, all wheat is sold through or under the auspices of the Board, and a bag of wheat cannot be consigned on the railway unless accompanied by a certificate from the Board.

RECEIVING, CLASSIFYING, AND GRADING.

In the sister States all grain transactions are carried out on a f.a.q. basis. In Queensland a different system is in vogue, the grain being classified as it is taken delivery of by the Board, the procedure being as indicated in the following paragraphs.

As each load arrives at the receiving centre, the classifier, in the presence of the grower or his carrier, takes a fair sample of wheat from each bag, and separates the load into grades, according to quality. The wheat is then passed to the stacking contractor with directions as to how to stack it so that the several grades may be available separately at any time for sale and outward delivery. Being in bags, every facility is afforded for inspection and selection, enabling the miller to purchase proportions of the various grades to suit his particular requirements.

The scheme of classification embraces three grades of milling wheat and three grades of inferior or feed wheat. Within each grade of milling wheat there is a range of dockage and premium below or above the mean average quality of wheat as designated Q1 or No. 1 Milling, these gradations descending or ascending by differences of ¼d. per bushel. Q1 or No. 1 Milling consists for the most part of wheat free from foreign substances, with good condition and colour, and of superior quality in every respect. Chondrometer weights range from 62 lb. as a mean, rising to 66 lb. and descending to 58 lb., the description being bright and dry, free from damage or foreign substances.

Q2 or No. 2 Milling consists largely of the same quality of wheat, but it contains other cereals, such as barley and oats, or foreign substances which prove a loss through separation in the process of milling, or it contains wheat which is to some extent bleached or otherwise deteriorated, and also grain which is pinched through dry conditions. This grade does not admit of grains which have germinated to any great extent.

Q2A or No. 3 Milling comprises wheat which, while usable for the purpose of flour manufacture, cannot be admitted into either Q1 or Q2.

To illustrate the scale of dockages and premiums, Q1 grade is determined as follows:—

On chondrometer weight less dockage for any foreign matter that the sample may contain.

Mean weight ..	62 lb.
Premium ..	63 lb. premium ¼d. per bushel
	64 lb. premium ½d. per bushel
	65 lb. premium ¾d. per bushel
	66 lb. premium 1d. per bushel
Dockage	61 lb. dockage ¼d. per bushel
	60 lb. dockage ½d. per bushel
	59 lb. dockage ¾d. per bushel
	58 lb. dockage 1d. per bushel

On Q2 wheat the dockages range from 1¼d. to 3d.

On Q2A the dockages range from 3¼d. to 5d.

F1A or No. 1 Feed is of milling appearance, but is affected by the presence of the objectionable odour of Hexham scent.*

F1 is fully developed grain, but has been affected by weather to such an extent as to exclude it from milling grades, or is musty, or smutty, or otherwise unsuitable for milling.

F2 or No. 2 Feed wheat is similar to F1 in respect of must and smut, but is pinched and generally of low value.

Dockages in feed wheats, in all cases, are tentatively fixed on a flat rate basis, usually 1s. per bushel of the estimated comparative value, according to the proportion of these grades contained in the total crop, but this dockage is reviewed on the finalisation of the season's payments from the net Pool realisations.

In an adverse season a considerable proportion of the lower-grade wheats are not acceptable for ordinary marketing purposes; nevertheless, the Board receives all wheat tendered, provided it is not in so damp a condition as to be quite unsuitable for storage, and even then, if there is a favourable market at the time of intake, such wheat will be received and disposed of without storing and a classification effected accordingly. At no time during the Board's existence has wheat been definitely refused, although growers have been advised to aerate grain and deliver it when found to be in a suitable condition.

Classification at intake is not final, the grower having the right of protest in case of dissatisfaction, and, in such cases, the sample is sealed in the presence of both disputants and forwarded to the head office of the Board for determination by the revising classifier, who, in addition, examines official samples of every delivery made to the Board so as to effect a necessary check on the outside classification.

SHEEP AND WHEAT.

Sheep and wheat is an excellent combination in most of the wheat-growing sections of the State. Of course, the area of the holding must be sufficiently large to permit of carrying the sheep when the wheatfields are under crop, and therefore not available for the livestock.

Sheep have many uses on any farm, but they are exceptionally useful on the wheat farm, for not only do they assist in the destruction of weeds and keep the fallows clean, but, in doing so, the weeds—otherwise a serious liability—are converted into an asset. Furthermore, in the event of a crop becoming too rank in growth because of seasonal or other conditions, they can be utilised for the purpose of checking it and thereby preventing loss which might occur owing to the crop lodging or being injured by frost.

The number of sheep which it is possible to carry comfortably and profitably is dependent on the district, on the size of the holding, and on the soil and improvements thereon. There are instances of growers on the Downs having 1,200 acres, 500 of which are under crop, chiefly wheat, carrying comfortably over a number of seasons up to 1,000 sheep.

Where the wheat crop is unduly advanced and it is deemed wise to check further growth by feeding it off with sheep, it is essential, after the sheep have been removed, to loosen the surface by running a set of heavy harrows over the field. This restores the soil mulch destroyed by the grazing sheep. Stock should not be permitted to graze a crop, more particularly on the heavier soils, when the ground is wet. If the crop is intended for grain, and sheep are put on when it is considered too forward, as many as are available should be depastured on the crop so that it may be fed off as rapidly as possible. Where the number of sheep is small and the area to be fed off is large, it will be found that after a few days the tendency is for them to remain on the area previously eaten off, evidently preferring the regrowth. In the Maranoa, sheep should be removed from the wheat by the end of June; on the Darling Downs they may be permitted to graze until the end of July with safety. Crops have been grazed until the end of August and a good bagging of grain obtained, but such is exceptional.

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* *Melilotus parviflora.*

Observations over a number of years support the contention that feeding off does not tend to increase the ultimate yield, but rather the reverse. That practice does result, however, in grain being obtained from fields which otherwise might be lost through lodging or frosting. There are stages in the growth of a crop of wheat, or in fact any winter cereal, beyond which it is fatal to feed off if it is intended for grain purposes. Whether this stage has been reached or not may be ascertained by taking one or more average stalks and dismembering them closely and examining them for the miniature ear. If such is discovered, no matter how small, the crop is too far advanced to be fed off if it is required for grain.

GROW MORE FODDER CROPS.

Every year, producers in the Maranoa and Western Darling Downs districts are confronted with the difficulty of maintaining the condition of stock during the winter months, when pastures are short and harsh. There is only one way out, and that is to take advantage of the better types of soil available and grow fodder crops—not in a haphazard, casual way, but by using a system by which land is given a fallow period prior to the planting of each crop.

The recent bountiful rains throughout these districts provided an opportunity for making a commencement with a fodder programme, and, in view of the erratic seasonal conditions usually encountered, every advantage should be taken of the moisture now in the ground. Many settlers have winter crops—such as wheat, oats, or barley—germinating now, and an excellent practice, particularly after the heavy rains experienced, is to give the crop a light harrowing as soon as the plants have a good hold in the soil. This should be done at right angles to the direction of sowing to check weed growth, prevent evaporation, and give plants a better chance to stool.

Following planting and harrowing, attention should be given to land intended for summer fodders such as Sudan grass, sorghums, Japanese millet, and cowpeas. There is every temptation to utilise every acre of available cultivation for sowing winter crops. In the very rare years when good winters are experienced, plough and plant methods may work out to some advantage, but far better results, on the average, will be obtained if a systemised cropping programme—including rotation of crops and fallowing—is adopted. Wherever possible, therefore, land which has not been prepared for winter crops should be ploughed and left in the rough state for early spring planting. In this way, moisture at present in the ground will be retained, and even light rains in spring will permit planting at that time. Apart from moisture conservation, the aeration of soil by fallowing oxidises plant foods and makes them more readily available to the growing crop.

Fat Lamb Raising

The Adaptability of the Merino.

LARGE areas in Western Queensland carry a good covering of high-quality grasses, but are largely devoid of either shrubs or trees. On these exposed plains the breeding of sheep cannot be carried on successfully, but, fortunately, they are within reasonable distance of other areas which, while similar in other respects, are shaded by a variety of shrubs and trees. Many western holdings include both classes of country, and ewes and growing sheep can be held on the shaded area, while wethers for wool production are run on the open plains. On holdings where no shade exists, fully-developed wethers are purchased from properties more favoured for breeding, and are then run for wool production.

In the southern division of the State, the country ranges from the cold granite and traprock country of the Stanthorpe district, to the rich plains along the New South Wales border. Intermediate types are the poor ridges interspersed between fertile plains, the vast areas of brigalow and belah which were held in the grip of the prickly-pear until a few years ago, and the excellent mulga country in the St. George-Charleville-Cunnamulla and far western districts.

Although the mulga country has a low carrying capacity, it is, when partly improved, suitable for breeding purposes, and supports some excellent stud flocks.

Brigalow country in its natural state is next to useless for sheep. When improved by ringbarking, it generally develops a rank weed growth. By stocking heavily with cattle, the weeds will be kept in check, and, subsequently, will give way to a good mixture of grasses, suitable for sheep. When cleared of excess timber, breeding can then be carried on successfully. As a general rule, however, the land should be seeded down to Rhodes or other suitable grasses after ringbarking.

The granite and traprock country is most suitable for running wethers for wool production. The extreme conditions under which merino wethers can be used to advantage is illustrated by the fact that wethers selected for wool production on the open plains of the West, also do well on the high, cold country of the South-east. The type generally favoured for the western plains is a large-framed, plain-bodied, robust sheep which produces a good length of bold-growing, medium to strong wool. Wethers of this type thrive on treeless plains, with no protection of any kind, and suffer no ill effects when the shade temperatures are high for days, and sometimes weeks, at a time.

The sheep selected for the granite and traprock belt of the South-east are usually four tooths of the finer wooled type, but of similar strain to those selected for the West. Each season, after they have been placed on the granite or traprock country, their wool fines down, probably because of a combination of climatic influences and the finer nature and less nutritive quality of the grasses. They do not cut as heavy a fleece as western wethers; but, if kept free from parasites, they do well even on the cold bleak heights ranging up to 3,000 feet above sea level. The adaptability of the merino to such extremes of climatic conditions is quite remarkable.

FAT LAMB PRODUCTION.

Gratifying results have followed the scheme initiated by the Minister for Agriculture and Stock with the object of stimulating the production of fat lambs. Rams of British breeds, comprising Border Leicesters, Southdowns, Dorset Horns, Shropshires, and Romney Marsh, were purchased in the South and distributed to farmers who had cultivation available, or who were prepared to cultivate. In certain cases in which a farmer owned a stud ram of a particular breed, stud ewes were supplied with the idea of fostering the breeding of pure stock. All sheep supplied to farmers are on loan, and remain the property of the Department. The progeny and wool, however, become the property of the farmers concerned.

The greatest drawback to the production of fat lambs on the Darling Downs in quantity has been, and still is, the difficulty of purchasing good crossbred ewes as the mother flock.

If a start has to be made with merinos, the best ewe for fat lamb raising is bred by the introduction of one of the long wools, such as Border Leicester, Lincoln, or Romney Marsh into the strong-woolled, robust type of merino ewe. The ewe lambs of this drop should then be retained as the future dams of the lamb-raising flock.

As to suitable ewes for the fat-lamb industry, it is believed that graziers on the fringe of the Darling Downs or further out would find it profitable to join long-woolled rams of British breed with their cast-for-age ewes with the idea of selling the progeny annually as fat lamb ewes on the Downs. Into the crossbred ewe flock, as described, should be introduced a ram of the Downs type. Opinions necessarily differ in the matter of crosses. The Southdown is the fashionable lamb at the present time, but it should be remembered that this cross must suffer no check from birth to block. The Dorset Horn gives a very nice lamb, early maturing and hardy. The use of the Border Leicester should be encouraged in every way. In addition to producing an early-maturing lamb that fills every want, it must be remembered that the skin value of this lamb is worthy of consideration to a far greater extent than either the Dorset or the Southdown.

Pure-bred Corriedale ewes are hard to come by, but should the opportunity occur a farmer would be well advised not to let it slip. Pure Corriedales are hard to beat, good mothers and heavy milkers, besides growing a profitable fleece.

Generally, the wool from a flock retained for fat lamb breeding is a secondary consideration when compared with the production of fat lambs.

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PREPARATION FOR SHEARING.

The shearing season will soon commence, and it behoves graziers to give that necessary attention to the shed, plant, and yards in plenty of time before the start.

Starting is often delayed, because everything has been left to the last minute. The shed itself should be clean, and all pen gates and hinges seen to to ensure convenient working. Grating floors, also, should be attended to where necessary.

The down shoots should be carefully repaired, if necessary, thus ensuring that shorn sheep are not ripped by outjutting nails, splinters, or other projections. Counting-out pens nearly always need repairing. The branding race and the gates at both ends should be in good working order.

Inside the shed, all machinery should be overhauled, belts examined, hand-pieces attended to, and oil cans ready.

The wool bins may need a nail or two, new rungs may be required in the wool-rolling, piece-picking, and classing tables.

The wool press should be overhauled thoroughly and the ropes examined, for if new ropes are necessary rigging them is a long job.

Have wool packs placed conveniently near the press, and all tools used in pressing in their places. Scales should be tested and every other detail attended to. If this work is neglected until the commencement of shearing, delays and frayed tempers are inevitable.

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QUEENSLAND SHEEP LANDS FOR SELECTION AT WINTON.

A resumption from Ayrshire Downs has been surveyed as portions 12, parish of Ayrshire, and 3, Wokingham, and will be open for Grazing Homestead Selection at the Land Office, Winton, on Tuesday, the 4th July, 1939.

The portions are situated about from 30 to 45 miles north-westerly from Winton, and have areas of 24,567 and 23,624 acres, respectively. The term of lease in each case will be for twenty-eight years, at an annual rental of 2d. per acre for the first seven years.

A condition will be that each selection must be stocked to its reasonable carrying capacity with the applicant's own sheep within the first three years.

The portions are watered by natural hole and by artesian bore drains, sub-artesian bores, and overshot dams, and the country is described as generally consisting of open brown soil downs, well grassed with Mitchell, Flinders, and blue grasses. The channel country is fairly well grassed and fairly well shaded with coolibah. It is excellent woolgrowing and fattening country.

Free lithographs and full particulars may be obtained from the Lands Department, Brisbane, the Land Agent at Winton, and the Queensland Government Tourist Bureaux at Sydney and Melbourne.

The Dairy Farm

Right Methods in Dairy Practice.

MANY dairy farmers—especially those who have only recently established dairy herds—are often unaware of the essential points for the satisfactory and cleanly production of milk and cream.

The bacteria responsible for the spoilage of milk and cream are to be found in large numbers on the farm, and if careful methods are not used, they may enter from any or all of the following sources:—

(*a*) The udder, if the animal is not absolutely healthy, and if foremilk is not discarded.

(*b*) The cow's coat and skin, if not groomed before milking.

(*c*) Dust in the cowbail or dairy.

(*d*) The milker's hands, clothes or person.

(*e*) Milk buckets and equipment imperfectly cleaned, or not sterilized.

The health of the cow is, of course, of first importance and the farmer must assure himself that every animal in his herd from which milk is being produced is in fit condition and free from any signs of disease.

Grooming the Cow.—Some preparation of the cow before commencing to milk is necessary in wet weather to remove the mud and dung splashed on the udder and teats, and, under summer or drought conditions, the dried dust, which is equally dangerous to milk quality.

The flanks and tails should be kept free from caked mud and dung by the occasional use of a currycomb, and the dust removed as often as necessary by grooming with a stiff brush dipped in clean water. It is a common practice on "model" farms to keep the hair on the flanks as well as the udder clipped short to avoid the collection of dust and dirt. Occasional clipping and regular grooming will make the daily routine of keeping the udder clean a very simple task. It is only when cows have been neglected that the washing of udder and flanks takes any great length of time.

The udder and teats should be washed before each milking. This is best done with a cloth (preferably of the woven type) kept for the purpose, and a bucket of clean water, using a separate cloth, with a second lot of clean water if necessary, for finishing off the udder. A small amount of potassium permanganate (Condy's crystals), or some chlorine compound added to the water is an extra precaution observed by many farmers, which is advisable if there are any cases of sore teats, or where the water used is of doubtful purity. The teats are left damp, but not dripping, so that any remaining dust or loose hairs will adhere to the surface and not fall into the milk. Udder cloths must be washed out and boiled every day, otherwise they become a dangerous source of bacteria and the object of washing the udder will be defeated Both cloths and bucket should not be used for any other purpose.

With practice, this routine preparation of the cow for milking can be very quickly and yet thoroughly carried out. It can be done by a boy, and the time spent—one minute or less per cow—is negligible compared with the reduction in the number of bacteria gaining entrance to the milk and cream from this source.

WASHING OF DAIRY UTENSILS.

The general principles underlying the proper cleaning of all metal milk utensils are very simple, and once understood they can be adapted to the requirements of individual vessels and apparatus used in dairying. For this purpose it is essential to understand something of the nature and composition of milk and its products. Milk is a complex substance consisting of water, butterfat, lactose, or milk sugar, casein, albumin, and mineral salts. Cream contains the same constituents in different proportions, so that the problem of cleaning is confined to finding effective methods for the complete removal of fats, sugar, proteins, and salts.

The sugar and mineral salts, being mainly in solution, are almost entirely rinsed away in cold water, which will also remove a large part of the fat and proteins. Butterfat, however, occurs in the form of minute globules, and some of these adhere to the surface of milk vessels and require heat and emulsification before they can be washed off. Of the proteins, casein is in suspension in fresh milk (giving milk its white appearance), but it can be coagulated by acid or by rennet to form a solid curd, the hardness of which is increased by heating; albumin is in solution, but, like egg-white, it is readily and permanently solidified by the action of heat. Both these milk proteins possess considerable adhesive properties (casein is used commercially in the manufacture of paints and glues) and they will, *if the preliminary cold-water rinsing is omitted,* stick firmly to dairy utensils, where hot water washing and subsequent sterilisation will only harden them on to the surface. Once fixed there, even in a very thin film, they form a protective layer where bacteria become lodged and breed, and where the sterilising heat cannot reach them, to the detriment of milk and cream quality. Similar protection is afforded by a layer of fat in the form of grease, which can be tested for by passing a finger over the surface of dairy equipment, and which is caused by using insufficient hot water, water at too low a temperature, or the lack of some soap or soda compound to free the fat.

There are, then, three stages necessary to the thorough cleaning of dairy utensils, as distinct from the sterilising, which must follow in order to destroy the harmful bacteria. These three stages are as follows:—

(1) *Cold Water Rinsing.*—Utensils should be well-rinsed as soon as possible after use. This is very important, for milk once allowed to dry is much harder to remove completely. Soaking in cold water for a reasonable time is advisable if washing is not to be done immediately—this will loosen all milk solids and facilitate washing.

(2) *Hot Water and Soda.*—Washing soda, caustic soda, soap, or soap powder are suitable cleansers for farm use (besides many proprietary preparations sold under trade names). Care should be taken to avoid cleansers containing any gritty substance, for this will permanently damage the surface by scratching, and will rapidly remove tinning. The water should be really hot, and enough soap or soda should be used to emulsify the grease, so that no globules of fat can be seen floating on the surface of the water. A stiff brush should be used on each utensil and all loose parts such as taps and strainer discs should be dismantled for scrubbing.

(3) *Hot Water Rinsing.*—A final rinse, using fresh hot water, is needed to remove the soda water before sterilising.

Milk utensils, if not properly cleaned and sterilised, are by far the most fruitful sources of contamination in the course of milking and handling milk and cream, and it should be remembered that both processes are equally essential, for satisfactory and complete sterilisation is not possible without first thoroughly cleansing along the right lines.

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WET OR DRY MILKING?

Many milk producers, careful in every other way to avoid contamination, still continue the unhygienic practice of wet-handed milking. Moistening the hands with milk direct from the teat, or, worse, by dipping into the milk pail, is a deplorable habit, which is responsible for much contamination as well as loss of quality of milk and cream. It is, of course, more serious if washing of the udder and of the milker's hands have been neglected, for then the dirt becomes intimately mixed with and well distributed throughout the milk. A glance at the accumulation between the fingers of a worker engaged in milking an unwashed cow wet-handed will be sufficient evidence of the truth of this statement.

Where washing of the udder and teats and discarding of the fore-milk have been carried out and the milker's hands have been washed, ''wet'' milking is less objectionable, but the fact remains that all the cleanest and most efficient up-to-date dairy farmers milk dry handed, and this is a necessity for the production of milk for sale as ''Tuberculin Tested'' or ''Accredited'' in England, and for the majority of organised milkers' competitions. ''Dry'' milking means that the hands are washed immediately before starting to milk and after completing each cow, being left slightly moist after washing, and are kept as free from milk as possible.

Some farmers, mostly those who have not persevered with dry milking long enough to give it a fair trial, object to it as being slow and difficult, especially as regards stripping. It has, however, been found by hundreds of others to be equally rapid and simple, after a little practice, provided that the hands are left damp and the teats sufficiently moist after washing to make them pliable.

It is true that there are individual cows with badly-formed abnormal teats, or with one or more sore teats, which are difficult to milk dry-handed. For dealing with these, the clean milker uses a small quantity of ordinary vaseline applied to each teat after washing, which not only serves as a lubricant but also assists in the healing of the damaged skin, and helps to prevent particles being rubbed off into the milking pail. Teat sores should be treated with some antiseptic ointment between milkings. This also prevents their becoming more serious through being worried by flies. Great care should be taken by the milker to wash his hands thoroughly after each cow, for obviously, this is a great factor in checking the spread of infectious sores and the transfer of bacteria picked up from the cow's coat, leg ropes, stool, walls, &c., to the freshly-washed udder of the next animal. (If a towel is used, it should be changed often enough to make sure that it is an asset to the hygiene of the milking shed. The clothes of the milker may also constitute a source of danger to milk quality—if, for instance, the same clothes are worn for milking as for feeding the pigs, grooming the cows, and removing manure. A pair of overalls or a sugar-bag apron, kept for milking only, and washed out at least once a week is within the reach of all.

Vaseline may be found of assistance to the man who has made a long practice of wet-handed milking when he first attempts the "dry" method, especially in stripping. It is preferable to use vaseline if, by thus easing manipulation, it prevents excessive downward jerking of the teats, which is often resorted to by an impatient milker, and which is not only quite unnecessary, but ruinous to the delicate udder tissues. After a time, however, it will be found that dry milking can be carried out easily and rapidly with no lubricant other than the moisture supplied by washed teats and hands.

This is being done on hundreds of modern dairy farms, where greater efficiency and increased keeping quality are aimed at, and, once established, this method is seen to be far superior to the old, which appears unhygienic, messy, and insanitary by comparison.

SCUMMY CREAM.

It frequently happens that when cream is being put through the strainer into the vat at a factory, a quantity of thick greasy substance is retained by the strainer. In most cases, this is due to the inclusion of the thick scum from the interior of the separator bowl with the cream. This is a practice which cannot be condemned too severely and results frequently in the cream being graded down.

REJECTION OF THE FIRST-DRAWN MILK.

The first step towards clean and, therefore, profitable milking is the washing of the cow's udder and teats to remove dust and dung particles and loose hairs, which, if they fall into the milk, carry with them enormous numbers of bacteria. The second is the removal of the first-drawn or "foremilk," which is a less commonly recognised source of troublesome organisms. The small quantity of milk left after milking within the narrow canal leading from the udder to the outlet of each teat forms a good breeding ground, where nourishment, moisture, and a suitable temperature are available for growth.

On account of their minute size, bacteria can penetrate past the "sphincter" muscle, which closes the teat when milk is not being drawn, and, especially in the case of older cows, where this muscle has become slack, large numbers may enter and become established in the teat canal between milkings. Thus it is advisable, before milking is begun, to remove into a separate vessel—a small pail or billycan is suitable but *not* a milking bucket—the first two or three streams from each teat. This will wash the teat canal free or almost free from contaminating organisms.

Experiments have shown that the foremilk, compared with the middle milk and strippings from the same cow, contains by far the largest proportion of the total bacteria, and, when it is considered that most of these may be from pasture, dung, soil, or contaminated stagnant water, which contain particularly obnoxious types, the value of rejecting the first-drawn milk can be better realised. It has been found to be an important contributory factor in lengthening the life of milk, whether it is intended for human consumption, cheese-making, or separation of cream for butter-making, and in avoiding bacterial taints and troubles such as ropiness and sweet curdling.

A far more important reason, however, why every farmer should make a practice of removing the foremilk regularly at each milking is that it enables him to notice anything abnormal in the appearance of the milk. Early indications of mastitis usually show up in the form of tiny clots or strings in the first-drawn milk, which if observed may mean the detection of animals having one or more affected quarters, before the disease becomes serious. Special care can then be taken to milk the infected cows last, their milk can be isolated from the rest, and the spread of the disease to other cows in the herd prevented.

Under no circumstances must the foremilk be withdrawn on to the floor of the milking bail, for this is one of the surest ways of spreading any infection that may be present. Apart from this, decomposition will take place with accompanying bad smells and attraction of flies.

It is well known that the highest percentage of butterfat in milk is contained in the strippings and that the first-drawn milk is the poorest portion, so that discarding it will involve only a small loss in quantity, which is more than offset by the improvement in keeping quality.

In large herds, where the quantity of foremilk is considerable, it can be pasteurised or boiled and used for calf, pig, or poultry feeding, unless definitely known to be infected. If it contains milk from diseased quarters, it should be disposed of by adding some disinfectant and emptying well away from cowbails and water supply.

The PIG FARM

Pig Feeding.

WITH good prices for pigs, it usually pays the farmer to purchase some concentrated foods to feed in conjunction with home-grown foods, which are relatively inexpensive, but insufficient to feed all his pigs properly. It rarely pays to keep pigs in store condition.

Given good weather conditions during the winter, the milk supply may not fall to any great extent, as forage crops would be available for dairy cattle. Forage crops could also be grown for pigs. Good green forage may be used to replace one-third of the growing pigs' ration and two-thirds of the dry sow's ration; hence, when weather conditions are favourable, an effort should be made to provide a succession of forage crops for pigs, and thus save an appreciable amount of grain, meal, and milk.

Crops suitable for autumn and winter planting include rape, field peas, and oats. Rape is a very quick-growing crop under favourable conditions, and is usually ready for grazing eight to ten weeks after planting. If the pigs are removed from the crop when most of the leaves have been eaten, the crop should make fresh growth, and in this way three or more grazings may be obtained. Field peas are best grazed by pigs when the seed pods are well formed, while the plant is still green; oats should be grazed off by pigs when about 10 inches high.

Wherever practicable, grazing is more satisfactory than cutting the crop and feeding it to pigs in their pens. If the regular pig paddocks can be cultivated, cropped, and fed off, the soil fertility will benefit, much labour and food will be saved, and the sanitation of the piggery will be improved.

OILING PIGS.

In cool weather, pigs do not wallow in mud moles as they do in the warmer months and so they do not have their natural protection from body lice. It will, therefore, be observed on examination that most pigs are now heavily infested with lice.

The pig louse is fairly large—about $\frac{1}{8}$ inch in length—and easily seen if the pigs' hair is turned back, or if sucking pigs are examined around the thighs and under the belly.

Pigs which are heavily infested with lice are unthrifty and slow growing, become debilitated, and are more susceptible to diseases.

The control of lice should receive the attention of pig raisers, for it is uneconomic to have lice-infested stock. Treatment with oil is practicable and inexpensive. Any oil applied to the pig's skin will destroy lice which come in contact with it. An oil in common use is crude petroleum oil. An efficient method of application is by spraying a very thin mist of oil through a pump spray, so that the pigs are completely covered with a thin film of oil. The oiling should be done in the late afternoon so that the sun will not cause the oil to "burn" the pigs. The pigs should be congregated in a race or pen or at the feeding trough, so that time and oil may be saved.

Three thorough oilings given at weekly intervals should assure complete control of pig lice.

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KEEPING PIGS HEALTHY.

By the general practice of hygiene and sanitation in the piggery, coupled with sound feeding methods, the incidence of most pig diseases can be considerably reduced.

The provision of roomy, well-ventilated, but draught-proof sties is essential.

The floors should be swept clean every morning, all refuse being taken away, and the yards raked over. Correct drainage of sties and yards will avoid the accumulation of water and help to keep down insanitary conditions.

Moisture is necessary for the free living stages of nearly all worm parasites; in its absence very few of them can survive for any length of time. Therefore, pig keepers who wish to avoid losses from worms must have dry, well-drained sties and yards.

Unhygienic and insanitary conditions are predisposing causes of rheumatism, catarrh, and some of the more serious bacterial infections—such as suppurative otitis and pneumonia. Piggeries should, therefore, be constructed on high ground, floors should be made of concrete and the run should be well sheltered from inclement weather.

Correct feeding and watering, together with adequate housing and paddocking, are undoubtedly most important factors in the preservation of the health of the pig.

Registered Hatcheries

Name and Address.	Name of Hatchery.	Breeds Kept.
G. Adler, Tinana	Nevertire	White Leghorns, Australorps, Rhode Island Reds, and Langshans
F. J. Akers, Eight Mile Plains	Elmsdale	White Leghorns and Australorps
E. J. Blake, Rosewood	Sunnyville	White Leghorns, Australorps, White Wyandottes and Rhode Island Reds
J. Cameron, Oxley Central	Cameron's	Australorps and White Leghorns
M. H. Campbell, Albany Creek, Aspley	Mahaca Poultry Farm and Hatchery	White Leghorns and Australorps
J. L. Carrick & Son, Manly road, Tingalpa	Craigard	White Leghorns
N. Cooper, Zillmere road, Zillmere	Graceville	White Leghorns
R. B. Corbett, Woombye	Labrena	White Leghorns and Australorps
T. G. Crawford, Stratford	Rho-Isled	Rhode Island Reds
Dr. W. Crosse, Musgrave road, Sunnybank	Brundholme	White Leghorns, Australorps, and Rhode Island Reds
Dixon Bros., Wondecla	Dixon Bros.	White Leghorns
Rev. E. Eckert, Head street, Laidley	Laidley	Australorps, White Leghorns, and Langshans
Elks & Sudlow, Beerwah	Woodlands	Australorps and White Leghorns
W. H. Gibson, Manly road, Tingalpa	Gibson's	White Leghorns and Australorps
Gisler Bros., Wynnum	Gisler Bros.	White Leghorns
G. Grice, Loch Lomond	Kiama	White Leghorns
J. W. Grice, Loch Lomond	Quarrington	White Leghorns
Mrs. M. Grillmeier, Mount View, Milman	Mountain View	Australorps
C. & C. E. Gustafson, Tannymorel	Bellevue	Australorps, White Leghorns, and Rhode Island Reds
P. Haseman, Stanley terrace, Taringa	Black and White	Australorps and White Leghorns
J. McCulloch, Whites road, Manly	Hindes Stud Poultry Farm	White Leghorns, Australorps, and Brown Leghorns
A. Malvine, junr., The Gap, Ashgrove	Alva	White Leghorns and Australorps
H. L. Marshall, Kenmore	Stonehenge	White Leghorns and Australorps

Name and Address.	Name of Hatchery.	Breeds Kept.
W. J. Martin, Pullenvale ..	Pennington ..	Australorps, White Leghorns, and Langshans
J. A. Miller, Racecourse road, Charters Towers	Hillview ..	White Leghorns
F. S. Morrison, Kenmore ..	Dunglass ..	Australorps, Brown Leghorns, and White Leghorns
Mrs. H. I. Mottram, Ibis avenue, Deagon	Kenwood Electric Hatcheries	White Leghorns
J. W. Moule, Kureen	Kureen ..	White Leghorns and Australorps
D. J. Murphy, Marmor ..	Ferndale ..	White Leghorns, Brown Leghorns, Australorps, Silver Campines, and Light Sussex
S. V. Norup, Beaudesert Road, Cooper's Plains	Norup's ..	White Leghorns and Australorps
H. W. & C. E. E. Olsen, Marmor	Squaredeal Poultry Farm	White Leghorns, Australorps, Black Leghorns, Brown Leghorns, and Anconas
A. C. Pearce, Marlborough ..	Marlborough Stud Poultry Farm	Australorps, Rhode Island Reds, Light Sussex, White Wyandottes, Langshans, Khaki Campbell and Indian Runner Ducks, and Bronze Turkeys
E. K. Pennefather, Oxley Central	..	Australorps and White Leghorns
G. Pitt, Box 132, Bundaberg ..	Pitt's Poultry Breeding Farm	White Leghorns, Australorps, Langshans, Rhode Island Reds, and Brown Leghorns
G. R. Rawson, Mains Road, Sunnybank	Rawson's ..	Australorps
J. Richards, Atherton	Mount View Poultry Farm	White Leghorns and Australorps
H. K. Roach, Wyandra	Lum Burra ..	White Leghorns and Australorps
C. L. Schlencker, Handford road, Zillmere	Windyridge ..	White Leghorns
A. Smith, Beerwah	Endcliffe ..	White Leghorns and Australorps
T. Smith, Isis Junction	Fairview ..	White Leghorns and Langshans
H. A. Springall, Progress street, Tingalpa	Springfield ..	White Leghorns
A. J. Teitzel, West street, Aitkenville, Townsville	Teitzel's ..	White Leghorns
W. J. B. Tonkin, Parkhurst, North Rockhampton	Tonkin's Poultry Farm	White Leghorns and Australorps
W. A. Watson, Box 365, P.O., Cairns	Hillview ..	White Leghorns
G. A. C. Weaver, Herberton road, Atherton	Weaver's Stud Poultry Farm	Wyandottes, Indian Game, Barred Rocks, Australorps, White Leghorns, Anconas, Rhode Island Reds, Buff Orpingtons, Black Orpingtons, and Buff Leghorns.
T. Westerman, Handford road, Zillmere	Zillmere ..	Australorps and White Leghorns
P. A. Wright, Laidley ..	Chillowdeane ..	Brown Leghorns, White Leghorns and Australorps
R. H. Young, Box 18, P.O., Babinda	Reg. Young's ..	White Leghorns, Brown Leghorns and Australorps

NEW REGISTRATIONS.

Following is a list of those who have applied for the registration of their hatcheries up to the 24th May, 1939:—

Name and Address.	Name of Hatchery.	Breeds Kept.
W. J. B. Foxwell, Coomera ..	Foxwell's ..	White Leghorns and Australorps
C. Hodges, Kuraby	Kuraby ..	Anconas and White Leghorns

BREEDING FOR EGG PRODUCTION.

In breeding poultry, the farmer should exercise the utmost care in order to establish and maintain a high quality flock. Considerable progress has already been made in the improvement of breeding practice. Egg production has been increased from about 60 eggs to over 200 eggs per bird per annum, many individual pullets laying over 300 eggs in a year.

In dealing with the egg production in a flock of birds consisting of an equal number of pullets and hens, many authorities quote twelve dozen as a fair average annual production. It is doubtful, however, whether there are many poultry farmers in Queensland who obtain an average production per bird of less than thirteen dozen eggs yearly. In some experiments conducted at the Animal Health Station, using White Leghorns purchased from a poultry farmer as day-old chickens, the average production over the two years was 181 eggs per bird, the variations being—pullet year, from 194 to 209 eggs; second year, from 155 to 162 eggs. In these experiments, 116 pullets were used, and the average of the two years was over fifteen dozen eggs, and even these birds in their second year laid over thirteen dozen. The birds were kept under poultry-farm conditions.

The poultry farmer should be able to obtain an average production at least equal to those figures. A constant high average production is only obtainable by good breeding, in conjunction with good management and feeding.

The chief considerations in establishing standards of good breeding are:—Type, constitutional vigour, action, and laying characteristics. Having selected birds reasonably true to type, care must be taken to see that they are of strong constitutional vigour. This is indicated by the vitality, stamina, health, brightness, and alertness of the bird, and is of equal importance to the knowledge of the actual number of eggs laid. As an example, some years ago the first three birds in a laying test laid 302, 296, and 294 eggs, respectively. An examination of these birds at the conclusion of the test showed that the first and second birds were weak in constitution, whereas the third bird was very strong. All these birds were used as breeders, but while the progeny of the first and second hens were disappointing layers, the descendants of the third bird have performed very well in laying tests every year since. That example should emphasise very clearly the necessity for rejecting birds that are weak constitutionally.

Admittedly, it takes courage not to breed from a 300-egg bird. If such a bird produced the eggs without a heavy drain on her body she would be constitutionally strong. If, however, the bird rapidly loses condition during the year, she is obviously weak in constitution and, consequently, would probably be an indifferent breeder. Any bird that is unable to stand up to a heavy season's laying without losing condition cannot be expected to give high-laying progeny and should be discarded, irrespective of other characteristics.

Agricultural Notes

Cotton Culture.

COTTON growing is one of the few primary commodities for which there is an unfulfilled demand in Australia.

The Queensland cotton industry is established on a co-operative basis and is one of the few industries in which the product grown is handled by the growers' organisation from the field to the manufacturer. This organisation—the Queensland Cotton Board—takes control of the seed cotton when it leaves the farm, transports it to the nearest ginnery, gins the cotton, markets the lint, and manufactures by-products, all the resultant profits being returned to the grower.

The advantages of cotton as a rotational crop in any farm system, and especially in combination with dairying, should appeal to most farmers with suitable country. Over a number of years, cotton has proved its adaptability to the conditions within the recognised cotton growing regions, and can be successfully grown on most of the main soil types within these areas. It offers distinct advantages over many other crops because of its drought-resistant qualities.

The suitability of cultivations newly broken up out of the original grasslands has been studied carefully for several years, and it is obvious that substantial benefits are obtained on most soils when cotton is grown in rotation with pastures of a sufficient stage of establishment. The benefits which may be expected are increased yield per acre, improvement in lint quality, and reduced costs of production.

Observations have definitely shown that new cultivations, or recently ploughed Rhodes grass paddocks, produce heavier yields of lint cotton than do adjacent cultivations on which crops of cotton have been grown for more than five years in succession. The explanation of the increased yields may be found in several factors. The more important are the restriction of the soluble plant food nitrate-nitrogen in the soil to levels most suitable for the cotton plant and the maintenance of adequate supplies of organic matter (roots, leaves, stems, &c.). The latter prevent the soil particles from packing and give to the soil an open texture that allows of the quick and complete absorption of ordinary storm rains.

Another important feature of the pasture-cotton rotation is the reduction of production costs, brought about by the lessened number of workings required to keep the field clean in the first three or four seasons after being brought under cotton. Weed and grass growth is less, and the surface does not become compact with the occurrence of heavy rains.

To maintain the Queensland cotton growing industry on a firm basis, it is incumbent on the growers to supply fully the requirements of the spinners. To accomplish this, increased areas are necessary. When the general suitability of cotton for most of the soil types of the south-eastern portion of this State is considered, it becomes all the more apparent that growers cannot afford to exclude cotton from their system of farm cropping.

WINTER PREPARATION OF LAND FOR MAIZE.

To get the best results, maize requires a good soil in which a plentiful supply of plant food is available—a condition which can only be brought about by an early and thorough preparation of the land before planting, attention to the cultivation of the crop itself, and to the eradication of young weeds during its early growth.

The land should be ploughed to a depth of at least 9 inches during winter and allowed to lie in the rough until early spring. The action of frost and rain will improve the texture of the soil and will leave it in a mellow condition. In early spring, the land should receive a second ploughing which, if possible, should be a cross ploughing. This should not be so deep as the first ploughing, and should be followed immediately by a harrowing and cross harrowing to work the surface soil into a fine tilth.

If a crop of weeds is turned under during the second ploughing, planting should not be carried out for at least a few weeks to allow the weeds to rot. On land which is not too heavy and moist, rolling is desirable as it consolidates the soil and helps to make a good firm seed-bed. Rolling should always be followed by a light harrowing.

Preparation of Seed-beds.—The preparation of the seed-bed is one of the most important points in the production of maize. No amount of after-cultivation will undo the damage caused by planting in a badly prepared piece of land. One has only to see the difference, not only in the growth, but also in the colour of the foliage between a crop grown on thoroughly prepared and another on hastily prepared land, to realise how great the effect is.

Give the young crop a chance to become well established in a well prepared seed-bed—in which the young plants will not have to battle with a host of weeds—and the increased return will more than compensate for the extra time and labour spent.

Time to plant.—The best time to plant will naturally vary in different districts. In districts which have a long growing season and a comparatively regular rainfall, planting can be done whenever weather conditions are suitable—from August to late December.

Two very important points are—firstly, to chose a variety which is suitable for the district; and, secondly, to plan to have the crops tasselling, if possible during periods in which rain can usually be expected.

Maize must have moist conditions when tasselling, and if hot, dry winds occur during this period, the pollen is shed too early and fertilization cannot take place.

Seed should be sown in drills spaced 3 feet 6 inches to 4 feet apart. The wider spacing is essential for the tall-growing, late-maturing varieties. As a general rule, single spacing in the rows gives the best results, the grains being dropped singly, with a distance of approximately 12 inches between the grains for the quick-maturing varieties, and from 15 to 18 inches for the late-maturing varieties.

From 9 lb. to 12 lb. of seed is sufficient to plant an acre when sown in this way.

The seed drill is the best implement for sowing maize, as it ensures a good even spacing and no loss of moisture occurs during planting, as is often the case where furrows have to be opened up for hand planting.

◆

VALUE OF TREES ON THE FARM.

Trees serve many important purposes on farming and pastoral country.

Trees are valuable as—

1. Windbreaks and shelter belts.
2. For isolated or scattered shade and shelter.
3. A reserve supply of fodder for periods of drought.
4. Timber and fuel supplies.
5. Screens around dams and tanks to prevent silting up by dust, and undue evaporation of the water.
6. For the prevention of erosion on slopes and along the banks of creeks and rivers.
7. For ornamental plantations in improving the appearance of the home.

◆

WINTER-GROWING RHODES GRASS MAY CAUSE STOCK LOSSES.

Although warnings that the so-called winter-growing or frost-resistant Rhodes grass is a potential source of danger to grazing stock have previously been issued, some farmers may not yet be aware that this grass should be grazed with caution. Winter-growing Rhodes grass should not be confused with the more common Rhodes grass which makes a very valuable pasture.

The prussic acid content of winter-growing Rhodes grass has been determined in samples collected both in Queensland and in New South Wales, and the quantity found was sufficient to indicate that the grass may sometimes be toxic to animals. Little is known about the conditions under which stock losses due to ingestion of the grass may occur, and stockowners are advised to be very careful when paddocks of the grass are being grazed.

In districts where high-yielding winter-growing grasses and clovers can be grown, the use of the winter-growing Rhodes grass for grazing purposes is not recommended.

BINDWEED—A SERIOUS WEED PEST.

One of the most serious weed pests so far introduced into Queensland is the European bindweed. This plant first made its appearance on the Darling Downs about ten years ago, or perhaps earlier, and little trouble has been experienced, in a general way, until recently, but, judging by the number of specimens sent in to the Department of Agriculture and Stock, it has become very widely spread.

Farmers seeing small plots of it in their areas are advised to use every means of getting rid of it, for once it attains serious proportions eradication becomes almost impossible.

It may be described as a slender twiner with long creeping white underground stems, any part of which when broken off may form a new plant. The leaf is about 1 inch long, the flowers are white or pink—mostly white in the Queensland specimens—bell or broadly funnel-shaped, and ½ to 1 inch across.

Some method of eradication must be devised to destroy the underground parts. This is best done by starvation, and if the top green growth can be kept down by cultivation or by sprays, the underground parts will eventually become exhausted.

Pigs are fond of bindweed, and have been found useful in keeping the weed in check, both in Australia and abroad.

It is a much more serious pest at the present time in the Southern States than in Queensland, but unless small plots are destroyed as soon as they appear the plant will multiply rapidly.

THE BRISBANE SHOW.

The new industrial pavilion at the Exhibition Ground, which is just nearing completion at a cost of £40,000, with its 150,000 square feet of floor space will provide a fine setting for the vast range of primary and secondary industrial exhibits, representative of the State's enormous productive capacity, at the Brisbane Show in August.

The Postmaster-General's departmental display, together with the Queensland Government displays in agriculture and stock, also forestry and irrigation, will be outstanding features of the pavilion.

Another addition to showground architecture which will claim much public attention during the forthcoming show, will be the new Electricity Hall wherein the 1939 Electrical and Radio Exhibition will be staged. The State Electricity Commission, which has organised the various interests responsible for this new show development, is to be commended for its policy of reticulating electric light and power to country districts as rapidly as possible. There is obviously no reason why country people should not enjoy the amenities of the city, both on the farm and in the home. In this great developmental work the co-operation and the resources of the Brisbane City Council Electricity Department, the City Electric Light Co., Ltd., and the Electrical and Radio Federation of Queensland are very important. This display will present much of practical interest to the housewife and home lover. Every phase of the electrical industry, ranging from modern lighting systems, bathroom and kitchen equipments, to the very latest in electrical timepieces and radio equipment, will be interestingly set out.

Horticultural Notes

Selection and Care of Scions for Grafting Deciduous Fruit Trees.

TOO much care cannot be bestowed on the selection of scions to be used for grafting. Just as the grower expects to receive good trees from the nursery, so should he, in proposing to rework trees, take care to see that his scions are the best procurable, for the life of a reworked tree should be, if the job is done properly, just as long or even longer than if it had not been regrafted.

The scions should be obtained for preference when the wood is quite dormant, and since, "like begets like," they should be taken from selected trees that are healthy in all respects and, if possible, proved good croppers, or they may be taken from reworked trees, the scions of which had been in their turn carefully selected.

Scion wood can be taken from anywhere in the tree, but it should be but one year old—that is, of the previous season's growth and with apples and pears free from flower buds. With stone fruit, this is not always possible, because, in addition to the simple wood buds, they usually have multiple buds—i.e., both flower and a wood bud at the one location; this does not matter, because the outside flower buds will fall off, leaving the dormant wood bud in the middle.

Medium-sized wood is the best. Over-grown, coarse growth with long internodes should be avoided. Small thin growth also is undesirable.

As the grower usually has plenty of wood to select from, he can easily see that he has only the right material. If he has not, then he should get it from a neighbour, rather than attempt to use unsuitable material. The grower should see that he has plenty of scions, and he will find it advisable to allow for only one scion out of each wood stick. Assuming the wood sticks are about 18 inches long, the grower will usually find that with the bottom 4 inches the buds are poorly developed. The top 6 inches are too thin and the buds immature, leaving but 8 inches of the most suitable wood in the middle of the stick, out of which it is often hard to cut more than one scion. This applies to scion wood other than the peach or nectarine, which is an exception, because in grafting these fruits it is desirable, if the top portion of the scion is of sufficient thickness, to leave the terminal intact.

In grafting, the principle is to graft a dormant scion on to an active stock, and then, when the sap flows from the active stock into the dormant scion, it brings the dormant buds of the scion into life and growth commences immediately.

Some growers experience difficulty in keeping their scions dormant, but they will have no trouble if they go about it the right way.

The scions kept should not be merely an armful or prunings of the required variety buried in a trench in an orchard, sometimes without even a stick to mark the site, which often means hunting for hidden treasure, when the day for grafting arrives. They should first be tied into neat bundles of from forty to fifty scions to a bundle, labelled correctly as to variety and then buried, so that from a third to a quarter of the scion is in the ground and two-thirds to three-quarters above ground.

Choose for the site a place where they have a reasonable amount of moisture, but as little sun as possible, because it is the warmth of the soil that starts them into life. The south or south-westerly side of a building is a good site.

If the grower experiences difficulty in keeping the scions back because of his having a lot of grafting to do, and so that the period has to be prolonged, then he should dig them up one evening, leave them out all night, and replace them in the soil in the morning. This will act as a check without harming them in any way.

With scions of stone fruit, should the flower buds commence to swell or even come into blossom, the grower should not jump to the conclusion that they are too forward, because, on examination, it will usually be found that the wood bud which is situated in between the flower buds is still dormant. It is when the wood bud commences to shoot that they are too forward. Should the scions show signs of withering through insufficient moisture, they should be buried entirely in a moist place for some days. On no account soak them, because this will cause the buds to absorb a large quantity of water, which soon dries out again, and there is grave risk of the buds falling out.

When the time for grafting comes and the scions are dug up, it will usually be found that callus formation has started at the bottom—this is a normal provision of nature. Should some of the scions have failed to form this callus, however, they should be discarded, because usually there is something wrong with them.

Some growers are inclined to start grafting too soon. This is inadvisable. It is much harder to perform the operation if the sap in the stock is not running freely. In the Stanthorpe district it will be found that the best time to start is in the last week in August or the first week in September for stone fruits, and for apples and pears a month later. The period can be extended to so long as the scions remain dormant.

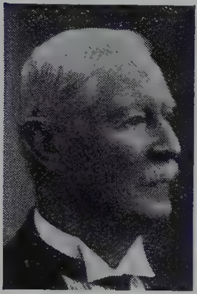
With grafting there are three essentials—(1) healthy trees; (2) good scions; (3) good workmanship. If any one of these three is lacking, then the result must be a failure.

Officers of the Department of Agriculture are in Stanthorpe to assist growers, and should anyone be in any doubt as to whether his trees are

In Memorium.

ROBERT WILLIAM WINKS

Mr. R. W. Winks, whose death in his 80th year has been announced, was one of the best known personalities associated with the foundation and progress of the dairy industry in Queensland. Of fine pioneering stock, among whom were some of the first settlers in the Fassifern and West Moreton Districts, he spent most of a long and useful life in rural industry, either as a producer or on its administrative side.



The late Mr. Winks joined the Department of Agriculture and Stock in 1893. He was first associated with the travelling dairy, an institution which did much to establish the industry in this State. Later he became a dairy instructor, and was some time in control of the dairying activities of the Department. On the passing of *"The Dairy Produce Act of* 1904" he assumed charge of the work of grading dairy products for export. When compulsory grading of butter—an innovation in Australia—was instituted he encountered considerable opposition, a circumstance which enabled him still further to demonstrate his marked ability, which was characterised by tact, firmness, competency, and the faculty of obtaining the whole-hearted co-operation of all associated with him. Subsequently, the Queensland grading system was adopted by the Commonwealth Government. He was senior grading inspector when he reached the retiring age twelve years ago. The valued service of Mr. Winks to the industry is now part of the history of the development of dairying in Queensland.

WILLIAM CHARLES THURLOW

Death claimed another old and valued officer of the Department of Agriculture and Stock when Mr. W. C. Thurlow passed on in his 79th year, just twelve years after his retirement from the Public Service in 1927. His first appointment was that of inspector of livestock and meat exports in 1899. He was afterwards appointed an inspector under the Slaughtering Act, and in the course of his duties became widely known and respected in all branches of the meat industry. He had a deep knowledge of livestock, was a recognised canine authority, and a noted breeder of pedigreed dogs. He also was an importer and breeder of milch goats, mainly of the Saanen breed.

In the course of a long and useful career, the late Mr. Thurlow rendered good service to the State, as well as to the department of which he was so capable an officer.

suitable for grafting, he should get in touch with the officer in charge, who will advise him as to their suitability or otherwise, and the best grafting methods to adopt according to the circumstances.

Further, should a grower be in any doubt as to his own capabilities as a grafter of trees, then the Departmental officers will be pleased to give him the necessary instruction. It is at times hard to understand how some growers, who have but a very hazy idea of grafting, have so little compunction in cutting down perfectly good trees and, through ignorance, spoiling them for all time, when an hour or two's tuition would enable them to do the work correctly and without doubts as to its success.

A pamphlet, "Propagation of Fruit Trees," dealing with this and many other points in orchard practice, is available on application to the Under Secretary, Department of Agriculture and Stock, Brisbane.

PRUNING DECIDUOUS FRUIT TREES.

The pruning of deciduous fruit trees has commenced, and this very important work should be done as well as it is possible for the operator to do it.

To make a good job of pruning, good, clean, sharp tools are very necessary. Pruners will find it useful to provide themselves with a light box—fitted with a strap to make carrying easy—for holding secateurs, pruning saw, sharp pruning knife, oil-stone, oil-can, pot of coal tar, a brush, and a bottle of disinfectant.

A good pair of secateurs is essential, and they must be kept sharp and smooth. Every pruning cut causes a wound, but wounds of small diameter soon callus over provided the secateurs are sharp and clean. Many pruners try to cut with their secateurs some of the larger limbs, and thus strain both the secateurs and their own wrists, while generally hacking the limb off and leaving rough edges which harbour pests, and facilitate the entry of fungous diseases. All large cuts should, therefore, be made with a saw which, like the secateurs, should be both sharp and clean.

A sharp pruning knife is necessary for trimming the rough edges left by the saw, for, if they are not pared, callus formation is slow and the wound may not heal.

The need for an oil-stone and oil is obvious. A rub of the secateur blades on the oil-stone now and again keeps them keen and sharp, and makes the work much easier.

Pruners should always have with them a pot of coal tar, for tar is a disinfectant as well as a wood preservative, and being pliable, makes a good surface covering. After pruning one tree and before going on the next, it is advantageous to paint all large cuts over with coal tar. The operation takes only a couple of minutes, and will help the tree considerably.

Both secateurs and saw often require disinfecting, for many diseases can be transferred from tree to tree by these implements. A strong solution of either formalin or corrosive sublimate rubbed over the blade with a rag will reduce any risk.

The foregoing suggestions are valuable, as fruit trees on which a man depends for his living, and which he expects to keep him for many years, deserve the best treatment possible in regard to pruning as well as to cultivation and manuring.

The Fruit Market.

J. H. GREGORY, Instructor in Fruit Packing.

COLD damp weather in South-Eastern Queensland during May had a detrimental effect on the fruit consumption.

Banana values are being well maintained and pineapples are selling at profitable prices. There is still too much green fruit going on to the Southern markets, thereby detrimentally affecting both price and demand. Cold weather has restricted the sale of tomatoes, and prices have consequently dropped. The demand for avocados eased somewhat. The quality of apples declined as the season advanced. Many lines are arriving from the South in poor condition and are hard to sell. Pears have maintained their quality and have sold well. Citrus fruits are now in full supply, and some excellent classes are on the market. Growers are advised to take particular care in keeping up quality, as a high percentage of waste is a common experience.

Prevailing prices at the end of May were:—

TROPICAL FRUITS.

Bananas.

Brisbane.—Cavendish: Small, 6s. to 10s.; Sixes, 6s. to 12s.; Sevens, 7s. to 15s.; Eights, 6s. 6d. to 15s.; Nines, 6s. to 17s.

Sydney.—Cavendish: Sixes, 14s. to 16s.; Sevens, 16s. to 18s.; Eights and Nines, 18s. to 20s.; Specials, higher.

Melbourne.—Cavendish: Sixes, 13s. to 15s.; Sevens, 15s. to 17s.; Eights and Nines, 17s. to 20s.

Brisbane.—Lady's Finger, 1½d. to 7d. per dozen.

Pineapples.

Brisbane.—Smoothleaf, 3s. to 10s. case; loose, 2s. to 7s. dozen; Ripley, 5s. to 9s. per case; loose, 2s. to 4s. per dozen.

Sydney.—Smoothleaf, 10s. to 18s. case.

Melbourne.—Smoothleaf, 10s. to 18s. case; green lines unsaleable; small fruit very hard of sale.

Papaws.

Brisbane.—Yarwun, 3s. to 5s. tropical case; Gunalda, 3s. to 4s. bushel case; Locals, 2s. 6d. to 3s. bushel case.

Sydney.—6s. to 12s. tropical case; inferior and green hard to sell.

Melbourne.—7s. to 11s. tropical case; green lines not wanted.

Custard Apples.

Brisbane.—3s. to 5s. half-bushel case.

Sydney.—6s. to 8s. half-bushel case.

Melbourne.—6s. to 10s. half-bushel case; Specials, higher.

Avocados.

Brisbane.—6s. to 8s. half-bushel case.

Sydney.—7s. to 10s. half-bushel case

Melbourne.—8s. to 10s. half-bushel case.

CITRUS FRUITS.

Oranges.

Brisbane.—Navels: Gayndah, 7s. to 10s. bushel case; Others, 6s. to 8s. bushel case; Commons, 4s. to 7s. bushel case.

Mandarins.

Brisbane.—Glen Retreat, 6s. to 10s. bushel case; Scarlets, 5s. to 8s. bushel case; Emperors, 5s. to 8s. bushel case; Fewtrells, 3s. to 6s. bushel case.

Sydney.—Queensland Mandarins, 11s. to 14s. bushel case.

Melbourne.—Emperors, 6s. to 10s. bushel case; Glen Retreat, 10s. to 12s. bushel case; Glen Retreat Gayndah, 12s. to 16s. bushel case.

Grapefruit.

Brisbane.—4s. to 6s. bushel case.

Lemons.

Brisbane.—Locals, 3s. to 8s. bushel case; Gayndah, 6s. to 16s. bushel case.

DECIDUOUS FRUITS.

Apples.

Brisbane.—Jonathan, 6s. to 10s.; Stanthorpe Granny Smith, 7s. to 11s.; Duke of Clarence, 5s. to 7s.; Sturmer, 7s. to 8s.

Pears.

Brisbane.—Josephine, 8s. to 11s.; Packham Triumph, 5s. to 9s.; Keiffer, 4s. to 5s.; Winter Cole, 9s. to 12s.

OTHER FRUITS.

Tomatoes.

Brisbane.—Coloured, 1s. 6d. to 4s. 6d.; Ripe, 1s. to 3s.; Green, 1s. to 3s.

Sydney.—Cleveland, 2s. to 4s. half-bushel case.

Passion Fruit.

Brisbane.—First Grade, 5s. to 8s.; Second Grade, 3s. to 4s.

Sydney.—5s. to 8s. half-bushel case.

Melbourne.—8s. to 11s. half-bushel case.

MISCELLANEOUS VEGETABLES, &c.

Sweet Potatoes.—2s. to 3s. bag.

Carrots.—3d. to 1s. bundle.

Cucumbers.—4s. to 7s. bushel case.

Pumpkins.—3s. to 5s. bag.

Marrows.—1s. to 3s. dozen.

Lettuce.—9d. to 2s. dozen.

Cabbages.—Small, 1s. to 2s. 6d. dozen; Prime, 3s. to 5s. dozen.

Cauliflowers.—Small, 4s. to 6s. dozen; Larger, 7s. to 16s. dozen.

Beans.—4s. to 6s. sugar bag.

Peas.—3s. to 8s. sugar bag.

Beetroot.—3d. to 6d. bundle.

Chokos.—3d. to 6d. dozen.

Rosellas.—3s. to 3s. 6d. sugar bag.

South Australian Celery.—16s. to 18s. per crate.

PRODUCTION RECORDING.

List of cows and heifers officially tested by Officers of the Department of Agriculture and Stock which have qualified for entry into the Advanced Register of the Herd Books of The Australian Illawarra Shorthorn Society, Jersey Cattle Society, Ayrshire Cattle Society, and Friesian Cattle Society production charts for which were compiled during the month of April, 1939 (273 days unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORNS.				
MATURE COW (STANDARD, 350 LB.).				
Valera Sheila (365 days)	M. C. and Q. M. Sullivan, Pittsworth	16,239·06	847·27	Loyalist of Strathdhui
Model 2nd of Alfa Vale	W. H. Thompson, Alfa Vale, Nanango	14,726·9	691·442	Reward of Fairfield
Blacklands Ethel 3rd	J. H. Anderson, Southbrook	11,310·46	453·606	Fussy's Monarch of Hill View
Carleon Kitty	W. Henrichsen, Clifton	9,919·25	414·120	May 2nd Charles of Cedargrove
College Stately 4th	Queensland Agricultural High School and College, Lawes	10,228·41	391·971	College Robin
Happy Valley Annie 5th	R. R. Radel, Happy Valley, Coalstoun Lakes	9,524·55	387·475	Venture of Happy Valley
SENIOR, 4 YEARS (STANDARD, 330 LB.).				
Pilton View Vera	P. D. Feichtner, Pilton View, Greenmount	8,590·7	342·551	Navillus Venus Shiek
JUNIOR, 4 YEARS (STANDARD, 310 LB.).				
Corunna Laurel (191 days)	J. H. Anderson, Southbrook	8,321·0	326·073	Viscount of Corunna
SENIOR, 3 YEARS (STANDARD, 290 LB.).				
Willow Farm Pidgeon 8th	A. H. E. Black, Kumbia	8,676·5	320·486	Willow Vale Hinkler
JUNIOR, 3 YEARS (STANDARD, 270 LB.).				
Highfields Princess 4th	J. A. Heading, Highfields, Murgon	10,451·1	409·556	Headlands Hero
SENIOR, 2 YEARS (STANDARD, 250 LB.).				
Trevor Hill Aster	Geo. Gwynne, Umbiram	9,893·93	416·391	North Glen Emblem
JUNIOR, 2 YEARS (STANDARD, 230 LB.).				
Gem 10th of Alfa Vale	W. H. Thompson, Alfa Vale, Nanango	10,853·45	440·026	Reward of Fairfield
Happy Valley Glory	R. R. Radel, Happy Valley, Coalstoun Lakes	9,257·95	338·632	
Alfa Vale Blossom 4th	F. G. Lamkin, Kaimkillenbun	7,565·31	315·26	Reward of Fairfield
Sunlit Farm Ida	W. H. Sanderson, Mulgeldie	7,249·2	287·241	Homelea Morning Star
Ehlma Park Pearl	N. Bidstrup, Warra	5,803·65	246·142	Mount Blow Monash
Sunlit Farm Lovely	W. H. Sanderson, Mulgeldie	6,967·8	233·303	Homlea Morning Star

JERSEY.

MATURE COW (STANDARD, 350 LB.).

White Rose of Hamilton	J. Wilton, junr., Raceview	8,705·72	505·504	Retford May's Victor
Choice of Hamilton	J. Wilton, Raceview	7,938·3	383·473	Retford May's Victor
Glenview Lady Lynn	F. P. Fowler and Son, Coalstoun Lakes	6,569·9	376·065	Carlyle Larkspur 2nd's Empire
Hampstead Beryl 6th	J. H. C. Roberts, 230 Herries street, Toowoonba	8,197·25	364·169	Kelvinside Favourite's Raleigh

SENIOR, 4 YEARS (STANDARD, 330 LB.).

Belgarth Buttercup 3rd	W. E. Lewty, Winera, Leyburn	6,700·25	413·225	Airlie Thorn

SENIOR, 3 YEARS (STANDARD, 290 LB.).

Lermont Rosebud	J. Schull, Lermont, Oakey	5,608·0	312·199	Woodside Golden Volunteer
Morago Robins Rosette	J. M. Newman, Caboolture	5,145·76	296·63	Oxford Robin

JUNIOR, 3 YEARS (STANDARD, 270 LB.).

Lermont Duchess	J. Schull, Lermont, Oakey	8,092·3	443·215	Woodside Golden Volunteer
Heatherbelle of Calton	Young Bros., Kingaroy	6,613·05	383·735	Retford Glory's King 2nd
Cabulcha Beatrice	J. M. Newman, Caboolture	5,816·81	342·771	Pymble Twilights Paragon

SENIOR, 2 YEARS (STANDARD, 250 LB.).

Trinity Pioneer's Daisy	Farm Home for Boys, Westbrook	6,122·25	346·325	Trinity Dreaming Pioneer
Bellgarth Birthday 4th	D. R. Hutton, Bellgarth, Cunningham	5,718·92	294·378	Trecarne Renown 2nd

JUNIOR, 2 YEARS (STANDARD, 230 LB.).

Bellgarth Blonde	D. R. Hutton, Bellgarth, Cunningham	4,776·28	280·079	Bellgarth Bellboy 2nd
Glenview Sweet Sultane	F. P. Fowler and Son, Coalstoun Lakes	4,690·65	247·4	Trinity Governor's Hope
Boree Tulip (250 days)	W. and C. E. Tudor, Branch Creek, Gayndah	4,767·47	240·356	Mountain Vale May's Squire

AYRSHIRE.

SENIOR, 4 YEARS (STANDARD, 330 LB.).

Myola Lady Jean	R. M. Anderson, Southbrook	14,377·04	684·883	Fairview Combination

FRIESIAN.

JUNIOR, 2 YEARS (STANDARD, 230 LB.).

Ryfield Eva (258 days)	P. P. Falt, Ryfield Stud, Wondai	7,057·6	324·77	Ryfield Argus 2nd

General Notes

Staff Changes and Appointments.

Miss M. Osborne has been appointed assistant cane tester at the South Johnstone Mill, in place of Miss M. E. L. Wassell, resigned.

Mr. A. Lewis, Maryvale, has been appointed an honorary protector under the Fauna Protection Act and an honorary ranger under the Native Plants Protection Act.

The Officers in Charge of Police at Calen and Carmila have been appointed also acting inspectors of stock.

Stallion Board appointments:—

Darling Downs North.—Messrs. J. C. J. Maunder, B.V.Sc., Government Veterinary Surgeon (Chairman), W. C. Jeffery (Miriam Vale), and G. Elliot (Laidley South).

Darling Downs South.—Messrs. A. F. S. Ohman, M.V.Sc., Government Veterinary Surgeon (Chairman), W. O. Scott and W. Frood (Toowoomba).

West Moreton.—Messrs. A. F. S. Ohman, M.V.Sc. (Chairman), T. MacDonald (Wooloowin), and D. Jackson (Teneriffe).

Wide Bay.—Messrs. R. D. Chester, B.V.Sc., Government Veterinary Surgeon (Chairman), T. Turkington (Upper Pilton), and J. H. Salmon (Rockhampton).

Burnett.—Messrs. R. D. Chester, B.V.Sc. (Chairman), T. Turkington, and J. H. Salmon.

East Moreton.—Messrs. J. C. J. Maunder, B.V.Sc. (Chairman), R. J. F. O'Bryen (Toowoomba), and D. Jackson (Teneriffe).

Central Coast.—Messrs. M. R. Irving, B.V.Sc., Government Veterinary Surgeon (Chairman), M. F. Yore (Logan Village), and E. S. Handley (Pampas).

Northern Coast.—Messrs. M. R. Irving, B.V.Sc. (Chairman), J. H. Wall (Rockhampton), and G. Elliot (Laidley South).

Northern.—Messrs. A. L. Clay, B.V.Sc. (Chairman), J. L. Bowman (South Brisbane), and W. Frood (Toowoomba).

Mr. C. Burchill, Police Magistrate, Innisfail, has been appointed chairman of the Goondi, Mourilyan, South Johnstone, and Tully Local Sugar Cane Prices Boards, and Mr. C. B. Buxton, Police Magistrate, Mackay, has been similarly appointed chairman of the Farleigh, Marian, Plane Creek, and Pleystowe Local Boards. Messrs. Burchill and Buxton have been given the additional appointment of agent of the Central Sugar Cane Prices Board.

Constable G. C. Cronk (Emerald) has been appointed also an inspector of brands.

Mr. H. J. Clifford (Cannonvale, Proserpine) and Messrs. C. F. T. Allender and R. Norris (Karumba) have been appointed honorary protectors under "*The Fauna Protection Act of* 1937," the lastmentioned in respect of the sanctuary recently established and which embraces the air base and pilot station at Karumba.

Messrs. W. Ferguson (Annerley) and W. L. Smith (Spring Creek) have been appointed honorary protectors under the Fauna Protection Act and honorary rangers under the Native Plants Protection Act.

Mr. G. K. L. Clark, inspector under the Stock, Slaughtering, and Dairy Produce Acts, has been transferred from the Murarrie Bacon Factory to the Oxley Bacon Factory.

Constable F. E. Towner (Tiaro) has been appointed also an inspector under the Slaughtering Act and the Brands Acts.

Mr. W. R. Johnstone, St. John's Wood, Ashgrove, has been appointed an honorary protector under the Fauna Protection Act.

Mr. L. E. Nichols has been appointed a dairy technologist, Department of Agriculture and Stock.

Messrs. F. W. Blackford, B.Sc.Agr., and J. E. C. Aberdeen, B.Sc.Agr., Assistants to Research Officers, Division of Plant Industry (Research), have been appointed Assistant Research Officers, Plant Pathological Section, Division of Plant Industry (Research), Department of Agriculture and Stock.

Mr. R. Walsh, appointed recently an inspector under the Diseases in Plants Acts, will be attached to Brisbane.

Messrs. H. Lambert (Acacia Bank), F. C. Jorss (Maryborough), and R. J. Rollston (Greenslopes) have been appointed assistant inspecting cane testers for the forthcoming sugar season, with headquarters at Cairns, Mackay, and Bundaberg, respectively. Messrs. Lambert, Jorss, and Rollston have been given the additional appointment of cane tester at each of the sugar mills in their respective districts.

Mr. D. Ryan, Court House, Bundaberg, has been appointed an agent of the Central Sugar Cane Prices Board during the absence of Mr. C. D. O'Brien on special duty.

Mr. M. D. Davies (Commercial House, Queen street, Brisbane) has been appointed an honorary protector under the Fauna Protection Act.

Mr. W. W. Walker, of Dimbulah, has been appointed an honorary protector under the Fauna Protection Act.

Mr. B. Hickman, of Bororen, has been appointed an honorary protector under "*The Fauna Protection Act of* 1937" in respect of the sanctuary recently declared and which embraces properties in the parishes of O'Connell, Rodd's Bay, and Polmaily, Shire of Miriam Vale.

Constable A. E. Genrich, Talwood, has been appointed also an inspector under the Brand Acts.

The following cane testers have been appointed for the forthcoming sugar season:—

Messrs. L. J. G. Becker (Inkerman Mill), C. J. Boast (Qunaba), T. Breen (Marian), L. Chadwick (Tully), P. H. Compton (Maryborough), T. F. Corbett (Mulgrave), T. D. Cullen (Fairymead), L. G. F. Helbach (Pleystowe), T. Herbert (Invicta), J. Howard (Rocky Point), C. H. Humphreys (Mourilyan), H. C. Jorgensen (Babinda), A. G. Kelly (North Eton), J. Macfie (Moreton), S. McRostie (Proserpine), W. Richardson (Racecourse), G. Tait (Kalamia), R. D. Woolcock (Isis), and V. F. Worthington (Pioneer).

Misses D. Bowdler (Millaquin), E. Christsen (Cattle Creek), A. L. Levy (Plane Creek), M. A. Lyle (Bingera), M. A. Morris (Mossman), J. O'Flynn (Farleigh), I. Palmer (South Johnstone), and E. Rowe (Gin Gin).

The following have been appointed assistant cane testers for the forthcoming sugar season:—

Messrs. R. Anderson (Bingera), P. C. Boettcher (Proserpine), C. Boone (Kalamia), A. Byrne (Millaquin), L. C. J. Clifton (Kalamia), W. C. Cocking (Farleigh), D. M. Corbett (Tully), H. J. Heidke (Qunaba), J. D. Kinnon (Inkerman), J. Mackenzie (Pleystowe), B. McMaugh (Invicta), R. A. Mahony (Pioneer), C. M. Martin (Marian), V. B. Martin (Maryborough), J. H. Murtagh (Babinda), R. D. R. Rex (Bingera), W. P. Snewin (Racecourse), C. Steley (Plane Creek), R. A. Stephenson (Invicta), J. Y. Taylor (Moreton), P. A. Van Lith (Cattle Creek), D. Walton (South Johnstone), and S. Wilson (Isis).

Misses D. Aldridge (Isis), A. Anderson (Bingera), F. Atherton (Marian), K. Backhouse (Farleigh), E. A. Crees (Plane Creek), F. G. Eadie (Pioneer), F. Foubister (Racecourse), N. Hooper (Pleystowe), M. H. Makings (Moreton), K. M. O'Brien (Proserpine), W. A. Page (Fairymead), P. Southwick (Tully), P. Thorburn (Fairymead), M. E. L. Wassell (South Johnstone), and S. Wilkinson (Mourilyan). Mrs. M. E. Nally (North Eton).

Wheat Payments.

A distribution of a sum of £65,525 to 3,800 wheatgrowers in this State will be made by the Department of Agriculture and Stock according to a recent announcement by the Assistant Minister for Agriculture and Stock (Mr. D. A. Gledson). This payment, which represents a first advance of a grant to growers under "*The Wheat Industry Assistance Act*, 1938," is made on the basis of two pence (2d.) per bushel of wheat of the 1938-1939 crop harvested on or after the 1st October, 1938, and sold or delivered for sale.

The payment is made out of the fund created by collections of flour tax during the first year of operation of the legislation. The total payment per bushel which growers will eventually receive cannot be stated at this stage, as it is dependent on the amount collected under the flour tax, but to meet the convenience of growers, and in order that the money will be available to them to assist in meeting the cost of the forthcoming crop, an advance distribution is being facilitated.

Flour Excise.

The Acting Minister for Agriculture and Stock (Mr. D. A. Gledson), commenting on statements made by some members of the State Wheat Board, as reported in the metropolitan Press of the 13th May, said that in these statements board members sought reasons for the apparent difference between States in the rate and date of the first payment from the excise on flour.

For the enlightenment of wheatgrowers generally, Mr. Gledson pointed out that, according to the estimate of the Commonwealth Government, the flour tax collections up till the 30th June next would amount to approximately £1,890,000. From these collections special assistance amounting to £553,000 has been set aside for the relief of necessitous growers in the States of New South Wales, Victoria, South Australia, Western Australia, and for a special grant to Tasmania. Queensland did not participate in this particular allotment. The balance of the fund, amounting to approximately £1,337,000, was to be distributed amongst the six States of the Commonwealth on a wheat production basis. The Commonwealth Statistician estimated the total Commonwealth production for the season at 150,000,000 bushels, of which Queensland deliveries, to 30th April last, totalled 7,864,976 bushels.

In anticipation of the flour tax collections, advances were made to the States to enable an interim payment to be distributed. The maximum advance to which Queensland was entitled to the 30th June next permitted a payment of two pence (2d.) per bushel to growers. A sum of £65,525 was absorbed in this payment, and a balance of £1,475 is held to meet claims on late deliveries. When funds are made available by the Commonwealth Government a final distribution will be made to growers. If Queensland growers are treated impartially in the allocation of the grant, it is not clear how there can be any differentiation between the grant per bushel made to this State and that made to each of the other participating States under section 6 of the Wheat Industry Act.

Any criticism of the delay in the distribution of the bounty was obviously made without a knowledge of the facts, said the Assistant Minister. For purposes of an efficient and correct check, his Department took over the work involved in the distribution of the grant, and, in doing so, it was necessary to check 80,000 delivery notes covering consignments to the Board by 3,800 growers who participated in the grant. Payment has been made in this State on all deliveries to 30th April, 1939, and cheques for the amount payable were despatched last week to all wheatgrowers concerned.

Inquiries made to-day reveal that the first advance in the other mainland States of the Commonwealth is still in course of distribution, whereas that of Queensland has already been finalised. Surely, suggested the Assistant Minister, wheatgrowers should be appreciative of the efforts of the Department to expedite these payments, and he also emphasised the fact that this work was performed by his Department at no expense whatever to growers.

Mulgrave Cane Disease Control Board.

Executive Council approval has been given to the issue of an Order in Council under "*The Sugar Experiment Stations Acts*, 1900 *to* 1938," constituting the Mulgrave Cane Disease Control Board in and for the cane-disease infested area declared by the Minister by notification in the *Gazette* on the 25th February, 1939—namely, the lands comprising the Mulgrave mill area. The Board consists of two representatives of millowners—Messrs. M. A. Doolan and M. C. Graham, of Gordonvale—and three representatives of canegrowers—Messrs. C. H. Crossland (Cairns), W. C. Griffin (Gordonvale), and S. H. Warner (Cairns), who will hold office until 31st March, 1941. Thereafter, members shall be elected biennially for a period of two years.

Pig Improvement Scheme.

Referring to the importation of British-bred pigs by the Queensland Department of Agriculture and Stock, the Assistant Minister (Mr. D. A. Gledson) said recently that good progress had been made by the Department in the distribution of the progeny of the imported pigs in furtherance of the scheme of pig improvement.

The young Tamworth pigs have been eagerly sought after, and the Berkshires, of which several have been sent to North Queensland, have given much satisfaction.

A number of excellent quality Middle White pigs have also formed the foundation for new herds of this breed, some now being located in Central Queensland.

Mr. Gledson remarked that information as to the breeding and availability of these pigs could be obtained on application to the Department of Agriculture and Stock, Brisbane.

Plywood and Veneer Boards.

Orders in Council (two) have been issued under the Primary Producers' Organisation and Marketing Acts amending the definition of a grower in the case of the Plywood and Veneer Board and the Northern Plywood and Veneer Board. In the existing constitutions of these boards, the definition of growers—"persons who own plywood and veneer plant and have produced plywood and veneer for sale"—does not give effect to the original intention, as the veneer manufacturer, who does not make plywood, would appear to be excluded from control by the board which has jurisdiction over the area in which he operates. The amendment approved, therefore, provides that a grower shall be a person who owns plywood and/or veneer, and has produced either or both of these commodities for sale.

Open Season for Duck and Quail.

An Order in Council has been issued under "*The Fauna Protection Act of* 1937," declaring an open season for duck and quail in Central and North Queensland.

In Central Queensland the open season will extend from 1st July, 1939, to 30th November, 1939, both inclusive; and in North Queensland from 1st June, 1939, to 31st October, 1939, both inclusive.

The attention of shooters is directed to an Order in Council which prescribes that twenty (20) wild duck and twenty-five (25) quail are the maximum numbers, respectively, which any one person may take during a period of twenty-four hours.

Wild Life Preservation.

An Order in Council, issued under "*The Fauna Protection Act of* 1937," declares the property of Mr. E. G. Lawrence, "High Tor," Maleny, to be a sanctuary for the protection of fauna.

An Order in Council has been issued under "*The Fauna Protection Act of* 1917," declaring the camping and water reserve at Baffle Creek, near Lowmead, a sanctuary for the protection of fauna.

Cane Disease Control Boards.

An Order in Council has been issued under "*The Sugar Experiment Stations Acts*, 1900 *to* 1938," constituting the Bundaberg, Isis, Maryborough, Moreton, and Mackay Cane Disease Control Boards in respect of the Cane Disease Infested Areas declared by the Minister by notification in the *Government Gazette* of 4th and 25th February, 1939. The Boards consist of two representatives of millowners elected by the millowners of the areas and three representatives of canegrowers elected by the canegrowers of the areas concerned. Members of the Boards shall be elected biennially for a period of two years.

Milk Supply Regulations.

Regulations have been issued under "*The Milk Supply Act of* 1938," which prescribe, amongst other things, the procedure of business at meetings of the Brisbane Milk Board; the registration of producers and wholesale vendors of milk; the issue of licenses to pick up and convey milk and cream on milk and cream routes; and the returns to be lodged by producers, wholesale vendors, and milk carriers.

Sale of Wheat.

The Acting Minister for Agriculture and Stock (Mr. D. A. Gledson), in a recent Press statement, clarified the position so far as the sale of this season's wheat crop is concerned.

The Acting Minister pointed out that several conferences had been arranged between representatives of the Wheat Board and the millers, at which no satisfactory decision could be arrived at. It was eventually agreed between the parties that the price of wheat for the season 1938-1939 should be determined by arbitration, and that this price should operate for the period from the 5th December, 1938, to the 15th October, 1939, inclusive, and that the decision of the arbitrator should be final and binding on both the Wheat Board and the millers.

Mr. T. A. Ferry was appointed arbitrator by the Government, and the matter was heard in the Industrial Court Room, Brisbane, on the 27th April last. The arbitrator has now submitted his decision to the Assistant Minister, and this decision is to the effect that the price to be paid by Queensland millers to the State Wheat Board for milling wheat for the current season, 5th December, 1928, to 15th October, 1939, inclusive, shall be Darling Harbour price, as at present determined by arrangement between the millers and the board on rails at sending station, less 2½d. per bushel, plus premiums and less rebates and other conditions as at present applying.

In announcing this decision, Mr. Gledson expressed his satisfaction that finality had been reached in a matter which had presented many difficulties.

Answers to Correspondents

BOTANY.

Replies selected from the outgoing mail of Mr. W. D. Francis, Botanist.

Transplanting Palms.

J.A. (Mackay)—

It is true that small plants, especially of the Bangalow or Pickabeen palm, are very difficult to transplant. It has been found much easier to transplant larger plants, say, 3 to 4 feet high. Even with these plants, the whole of the root system must not be bared. A good idea is to employ a cement cask sawn in halves cross-wise to transport the palm plants. A ball of earth about 1 foot from the base of the stem all round should be lifted with the plants. When transplanted in this way into a garden, palms in many cases take well in their new surroundings. Most palms which grow in the scrubs prefer a fairly good soil. If the soil in the garden to which the palms are to be transplanted is of a poor character, it could be enriched with some of the surface soil from the scrub or river forest.

Convolvulus.

W.S. (Helidon)—

Your specimen has been identified as a native vine of the Convolvulus family. It is known botanically as *Ipomoea plebeia*. It is occasionally a weed in cultivation, and if it is growing in or near a cultivation area, it should be destroyed.

A certain amount of publicity has been given to a serious weed pest on the Darling Downs and other places, which is known as European Bindweed (*Convolvulus arvensis*). This plant is different from that sent in by you.

Candle Nut.

L.L.R. (Bundaberg)—

The nuts come from the Candle Nut, *Aleurites moluccana*. This species is a native of the rain-forests of North Queensland, the Islands of the Pacific, and the East Indies. At times the nuts have been eaten without ill-effects. However, at other times violent purging has resulted. We cannot recommend them for human consumption on this account. In the Pacific Islands it is stated that the natives place the kernels on sticks and light them. On account of the oil the kernels contain, a light is provided in this way. The common name "Candle Nut" is derived from this circumstance.

Brachiaria Miliiformis.

C. Bros. (Home Hill)—

These specimens represent *Brachiaria miliiformis*, a grass with a very wide distribution through southern Asia, the Malayan Archipelago, and Australia. It is very abundant in Queensland, but unlike most native species, favours ground that has been broken, such as old cultivation areas, railway embankments, &c. It is not a common constituent of the ordinary pasture, though fairly frequent in sandy forest lands. It is very palatable and nutritious, and unless protected, soon disappears under stocking. It is a frequent weed of cultivation, but not in any way aggressive. It is an excellent hay grass. It comes in with the early summer rains, and dies off on the approach of autumn or early winter.

This grass is not a species of Mitchell grass.

Flannel Weed.

H.J.J. (Nikenbah)—

The weed is, as you suspected, the Flannel Weed. Its botanical name is *Sida cordifolia*. It is not known to be poisonous or harmful to stock. In tropical parts of Queensland, especially in the vacant lands about Townsville and Cairns, it is a serious weed. At times vacant allotments are covered by it to the exclusion of everything else.

Common Wormwood.

H.J.H. (Kumbia)—

The specimen you send belongs to an introduced plant, and is a species of *Artemisia*. It looks very much like *Artemisia Absinthium*. This plant is a native of Europe, where it is known as Common Wormwood. It yields a volatile oil consisting of absinthol and absinthin. This oil has tonic and febrifuging properties. The plant is chiefly used for the manufacture of the French liqueur absinthe.

Tick Trefoil.

E.A. (Cannon Pocket)—

The specimen is a native Tick Trefoil, *Desmodium triflorum*. This is a leguminous plant which is a fair fodder, although it grows too close to the ground to afford much feed for cattle. It is common throughout many coastal pastures. Probably you will find that in the spring and summer the Kikuyu grass will grow over it.

Asthma Plant.

M.M.B. (Mount Byron)—

The specimen is from the Asthma Plant, *Euphorbia pilulifera*, a decoction of which is used in the treatment of asthma. It is a very common plant in rockeries and on the edges of asphalt paths. It is not known to be poisonous to stock, although stock do not seem to eat it.

Rattle Pod.

G.W.K. (Bogantungan)—

The specimen is one of the Rattle Pods, *Crotalaria incana*. At different times species of Crotalaria have been suspected of poisoning stock, on account of their close relationship to the Rattle Pod *Crotalaria striata*, which was shown by experiments at Port Darwin to be poisonous to stock. Nothing definite, however, has been proved as to the harmful character of *Crotalaria incana*.

Green Cape Gooseberry.

C.F. (Jondaryan)—

The specimen is the Green Cape Gooseberry, *Physalis minima*. As you can see from the plant, it is closely allied to the edible Cape Gooseberry (*Physalis peruviana*). We have no records of the green Cape Gooseberry being poisonous to stock. We have received several reports to the effect that the ripe fruit when cooked have been eaten. It is noticable, however, that stock appear to avoid this plant, which suggests that it is at least unpalatable.

Jack Bean.

J.H.L. (Riverleigh, Gayndah Line)—

The specimen comes from a Native Jack Bean, *Canavalia obtusifolia*. This climbing plant is often very common in scrubs near beaches, in addition to being found in districts like yours. These beans are not considereed to be wholesome, but we have little information as to their effect on stock.

The genus Canavalia contains beans which are cultivated in the tropics, such as the Sword Bean and the Jack Bean. Some of these beans are wholesome, and others very closely allied to them are poisonous.

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SUNDAY MORNING—THE COUNTRYMAN'S SESSION.

Radio Service to Farmers.

Every Sunday morning at nine o'clock a bright, topical, and entertaining programme of information on rural subjects is broadcast from National and Regional Radio Stations. (By arrangement with the Australian Broadcasting Commission.)

Farmers are recommended to tune in to—
4QR (Brisbane), 4RK (Rockhampton), or 4QN (Townsville).

EVERY SUNDAY at 9 a.m.

Weather and market reports and a wide variety of farm topics.

Rural Topics

More Wool.

What we want is more wool per sheep per acre without additional cost to the producer, so that, if he is forced to sell it cheaply, his greater output may help to make up for the loss in value. It is felt that this cannot be done by simply muddling along. Some positive plan of campaign is essential, and such a plan might take in the reclamation of at least a portion of the waste which we all know occurs at the wool scour.

In some countries, most of the grease in the fleece is saved and converted into lanoline, chemical preparations, lubricants and other commodities, but whether it would pay to instal the necessary plants to extricate these products on a commercial scale in Australia is, of course, a matter for our economists.

Much scientific work has already been done in relation to these by-products, and it is hoped that investigations now in progress may reveal new uses for wool grease. If so, its commercial value will be enhanced, and this will help to swell the return per sheep.

Another point is the saving that may be gained in the production of wool tops in Australia. There is really no sound reason why a much bigger percentage of our export wool should not be shipped in this semi-manufactured condition, instead of being sent abroad in the grease. Apart from the additional employment to Australian workers, it would greatly reduce transport costs, because more than half of every bale we ship to-day consists merely of dirt and grease.

Even without the top-making business, it should be possible to do most of the scouring here, and so save the by-products and cut transport costs substantially.

—From notes by ''Mulga'' in the *Sydney Morning Herald.*

Wessex Saddleback Pigs.

Writing in regard to his experience in the handling of a large herd of Wessex Saddleback pigs, Mr. R. Turpin, of Kentville (Q.), advises that following his original and more recent importations of this type of pig, coupled with local experience in handling a herd of up to fifty breeding sows, he is quite convinced it pays to keep these pigs as pure breds in preference to using them for indiscriminate crossbreeding. He states he keeps none but purebred pigs as he has satisfied himself from the appraisal of export carcases from the Royal National Exhibition at Brisbane that he has developed a system of breeding and feeding which results in production of a very desirable export type. He adds that where crossbreeding is practised, instead of getting 100 per cent. type you never know which way the pigs develop.

His herd now consists of 50 or more sows and he expects soon to be marketing at least 1,000 pigs annually.

One of his sows, a progeny of Pensilva Star, farrowed recently a litter of eleven by the imported boar. These are well marked and the type sought.

—*E. J. Shelton.*

A Record in Cabbage Planting.

This is how it is done on a farm in the south-east of England: Cabbages are planted with a machine which can plant 6,000 an hour. It is towed at a walking pace by a tractor while four men seated on it keep it supplied with plants.

Best Time to Poison Green Timber.

The autumn is the best time to poison green timber with arsenic pentoxide or sodium arsenite. If the job is done when the sap flow in the tree is ceasing, suckering will be reduced to a minimum.

Treatment of Cream.

Dairy farmers are again advised to give close attention to the cooling, aerating, and stirring of cream. The flush growth of grass in the wet season often causes a gassiness in cream, as well as a ''feedy'' flavour. Aeration and cooling will do much to offset the development of these defects.

Risks of Imported Grain Varieties.

Now and again, farmers and others introduce seed of foreign grain varieties of which they have heard or which they have seen referred to in some newspaper either local or foreign, instead of obtaining advice or authentic information from the Department of Agriculture and Stock. As reported in the "Sydney Morning Herald" some little time ago, a well-known farmer in a neighbouring State introduced a hundred pounds (£100) worth of seed of a European wheat, which turned out to be very late-maturing, red-grained winter wheat, which never came into head until the normal Australian varieties were nearly ready to harvest, and which, of course, was a rank failure.

Later, a cable message from England was published in the Australian Press and which boosted a new English variety of wheat. This variety was said to be superior to any other variety in Great Britain, and highly resistant to rust.

Inquiries were made at the Cambridge Plant Breeding Institute and a reply was received to the effect that the original Press notice was wholly inaccurate.

A new English variety called Holdfast has been under observation. It proved to be about four weeks later in maturing than Yandilla King, and is definitely of no value to the Australian wheat grower.

Plant introduction is so intimately related to plant breeding that it should be kept in the hands of the practical plant breeder, who is the best able to speak of the most likely source of varieties similar in type to local varieties, and to utilise in cross breeding any characters of value in such introduced material.

Careful Droving Pays.

The droving of stock has taken on a new significance nowadays. A slight bruise suffered by the animal when it is alive will disfigure the carcase on the hooks and will reduce the value of the carcase to a considerable extent.

Cattle intended for the exacting chilled beef trade have to be handled with the greatest care, and if the stockowner is not doing his own droving, only a drover in whom he has the greatest confidence should be considered for the job.

Rough handling means reduced profits, and the grazier who has taken the greatest pains to produce the best quality beast may have all his good work undone by a careless drover. A good drover will always get a good delivery at the yards.

In driving mixed lots of fat and store animals, the competent drover regulates the pace to suit the heavier beasts. The careless drover—in fact, there shouldn't be a careless drover, he has no business on a stock route—only succeeds in running the beef, or mutton, off the mob.

Manuring by Water.

American farmers who discovered years ago that they could water their crops by gravity, now find that they can mix fertilizers in their irrigation water and let gravity give their crops a feed and a drink at the same time.

Long past the experimental stage is this method of crop manuring. One firm selling ammonia gas for irrigation water says that their sales have increased over ten times in the last four years; another, selling calcium nitrate, reports similar increases. All indications point towards an even greater increase.

It's not a new idea. A methodical Chinese gardener applies it by throwing a shovelful of chemical fertilizer at regular intervals into an irrigation ditch. It may be crude, but the method works surprisingly well.

Helped along by research workers, farmers in the western States of America (according to a report published in "The New Zealand Farmer") have originated devices which measure carefully and distribute an exact amount of commercial nitrogen into irrigation channels. One concern has recently bottled ammonia gas (80 per cent. nitrogen) in steel cylinders. The gas bubbles from the cylinder into the water.

With this method of manuring, hauling and spreading are eliminated. Fertilizer can be applied at any time during the growing season, which is not possible when broadcasting. This assures a supply of nitrogen when the crop needs it most.

Commercial nitrogen (such as calcium nitrate and ammonia sulphate) are being used in much the same way as the ammonia gas. Some farmers mix it in a tank and let the concentrated solution drip into the irrigation water; some scatter the material in irrigation furrows; others simply slash open a bag and hold it in the irrigation dish until all the material has been dissolved.

Grassland Management—How It Is Done in New Zealand.

Some interesting information has been brought back by some southern farmers who returned recently from a tour of New Zealand. The graziers in the party agreed that, despite the difference of conditions in the Dominion, Australia could learn a lot from New Zealand, chiefly in respect of rotational grazing. This is fast becoming the accepted practice in New Zealand, especially in districts of intensive production where it is regarded as quite as important as pasture improvement.

On a property in the Palmerston North district, the party visited a farm of one hundred acres (100 acres), on which a thousand (1,000) breeding sheep are carried all the year round. During the flush of the season, the owner said, up to 2,500 ewes and lambs are carried; and, in addition, 182 tons of grass hay are taken from one seven-acre paddock.

The present owner told his visitors that when he took over the farm some years ago the carrying capacity was estimated at not more than three sheep to the acre. The adjoining property still carries only that number. The secret, he claimed, was in subdividing the area, as well as improving pastures, and then grazing strictly according to rotation.

The farm is divided into twelve paddocks, all sown heavily with rye grass and clovers. All the sheep on the place are put into one paddock at a time, but never for longer than one day. Thus every part of the pasture is eaten down completely, no corners are left ungrazed, and the paddock then has twelve days free from grazing in which to recover.

The New Zealanders impressed the party with the thoroughness with which they explored every possible way of improving their stock and pastures.

Coastal Counter Lunches for Stock.

Officers of the New Zealand Department of Agriculture have observed recently that all along the northern portion of the eastern coast of the South Island stock are keen to keep to the beaches to browse on various kinds of seaweed which is washed ashore in, it is estimated, thousands of tons.

Both cattle and sheep appear to relish this free counter lunch, and observers state that the animals which feed on seaweed seem to have more vitality and ''a certain liveliness'' which is not seen in animals running on pastures further inland. The reason for this is not yet certain. Some farmers look upon the washed-up seaweed as good feed, but others more versed in scientific agriculture are of opinion that the seaweed eaten is not so much an actual feed as a tonic. A chemical investigation has been started so as to find out the nutritional or tonic properties of this ''buckshee'' ration.—*The New Zealand Farmer.*

A Good Farming Recipe.

Mr. M. L. Mosher, of the Illinois College of Agriculture, gave this recipe for good farming at a local gathering of farmers:—

Good rotation and field management.
Suitable class and number of live stock.
High crop yields.
First-class farm animals.
Careful employment of labour.
Effective power and machinery.
Good buildings and fences (but not over-capitalised).
Close study of markets.
  Mixed with—
Love of farm work and farm life.
Constant study of farm business.
Timeliness and regularity.
Kindness—cleanliness—and thoroughness that will do a good job.

Salt for Pigs.

Salt is harmful to pigs only when fed in excess. In tests to determine whether salt has any toxic effect increasing amounts up to 2.5 oz. of salt a day were fed to pigs without any harmful result, and the animals gained normally in weight. This result was obtained under conditions in which the pigs had free access to water, for if pigs are fed increasing amounts of salt without water the result will be disastrous.

Orchard Notes

JULY.

THE COASTAL DISTRICTS.

IN many centres the bulk of the citrus fruits, with the exception of the late-ripening varieties, will have been harvested, and cultural operations should be receiving attention.

Trees which show indications of impaired vigour will require a somewhat heavy pruning, both in respect to thinning and shortening the branches. Where the trees are vigorous and healthy a light pruning only will be necessary, except in the case of the Glen Retreat mandarin. The densely-growing habit of this variety leads to a profusion of weak shoots, which, if allowed to develop, will cause overbearing with resultant small and inferior fruit at an early age.

Where trees show signs of failing, investigations for the presence of collar rot should be made at or near ground level. The roots should be examined for disease, and in the North Coast districts for the presence of the citrus root bark channeller. A light application of paradichlorobenzene buried a few inches deep in circular drills around the tree and with the surface stamped firmly has been recommended for controlling this pest. The distance between the circular drills should be not more than 18 inches, and care should be taken to prevent the crystals of paradichlorobenzene from coming into contact with the roots. It may be necessary to repeat the application after an interval of three or four weeks.

Where it is necesary to control black spot, melanose, and scab, the fungicide should be applied at the correct time. The control measures recommended are—

For Black Spot.

Bordeaux of 3-2-40 strength or Bordeaux of 3-2-40 strength + 1 per cent. of oil emulsion—

(1) As soon as the fruit has set;
(2) About a month to six weeks later;
(3) If black spot has been serious previously, another application just prior to the February rains.

For Melanose.

The use of a similar fungicide—

(1) Immediately the fruit has set;
(2) A month to six weeks later, or more often if the weather conditions are exceptionally wet.

For Scab.

(1) Bordeaux mixture 6-4-40 or Bordeaux 6-4-40 + 1 per cent. oil emulsion immediately before the new growth commences; this will help to clean up fungus on the old scabs;

(2) Bordeaux 3-2-40 or Bordeaux 3-2-40 + 1 per cent. oil emulsion at about the middle of the flowering period; this and subsequent applications are for the protection of young foliage and fruit;

(3) Bordeaux as soon as the fruit has set;

(4) If the season is exceptionally wet, it is advisable to give one or two further applications in order to keep the young fruit and foliage well covered.

Where for any reason healthy trees of vigorous constitution are unprofitable, they may be headed back—in fact, have the whole of the top removed—leaving a few selected arms. All other branches should be cut away at their source of origin. The three or four remaining arms, of which lengths will vary from 2 to 4 feet, will form the future framework of the tree. Care must be taken to cover the whole of the exposed bark with a suitable coating of whitewash to prevent sunburn. The numerous shoots which will grow from main arms should be suitably reduced, leaving from two to four on each arm. Under favourable conditions, these will be in a fit condition to receive selected buds from desirable trees by the following autumn. It is desirable that when shoots intended for budding have attained a length of from 6 to 9 inches, their terminals should be nipped off in order to stiffen their growth and guard against the possibility of damage by strong winds.

Fertilizing should be completed as early as possible, the mixture for the spring application being high in readily available nitrogen. Ploughing should then be completed, the depth being regulated by local conditions and the nature of the original preparation of the land. Following the ploughing, the land should be worked down to a fine state of tilth. On hillside orchards, attention should be given to the care of possible storm waters. Cultivation should be so arranged as to form shallow drains or banks along the tree rows and across the heaviest slope, leading into suitable side drains which may be grassed to prevent erosion.

The planting of trees may be continued and, with the exception of custard apples, expedited. The attention of citrus growers should be confined to varieties suited to their local conditions.

The pruning of grape vines should be completed, and where cuttings for planting are required these should be selected, trimmed, and heeled-in in slightly dry soil. Canes intended for cuttings should not be allowed to lie about and dry out, but should be treated the day they are severed from the plant. Cuttings are frequently made of excessive length. From 10 to 12 inches is a suitable length which allows for insertion in the soil so as to permit of the top bud, with a short section of the internode, protruding above the surface.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

ALL pruning other than that applied to peaches and varieties which are late in coming into growth should be completed this month, and the planting of young trees, if not already done, should no longer be delayed. Early planting is preferred, the sooner after the fall of leaves the better. When there are indications of the swelling of the buds, the time is opportune for working over unprofitable trees, where the stock is reasonably vigorous. Strap grafting, as advised by the local field officers, is the most satisfactory method of top-working deciduous trees.

The pruning of vines should be postponed as long as circumstances permit, and these can only be gauged on actual observation as they are subject to much variation.

The usual winter working of the land is essential for the retention of moisture and aeration of the soil, but in shallow soils in which many orchards are planted, deep working is most detrimental. The matter of seedling stocks for apples and the inferior plants frequently received from Southern nurseries prompts a query as to how many seeds have been stratified for spring planting, and whether any effort is being made towards raising a local supply of nursery stock.

WINTER ACTIVITIES IN THE ORCHARD.

Clean up all orchards and vineyards, destroy all weeds and rubbish around the trees likely to harbour pests of any kind, and keep the surface of the soil well stirred, so as to give the birds and predaceous insects every chance to destroy any fruit-fly pupæ which may be harbouring in the soil. If this is done, many pests that would otherwise find shelter and thus be able to live through the winter will be exposed to both natural enemies and cold.

Pruning can be started on fruit trees which have shed their leaves, as it is a good plan to get this through as early in the season as possible instead of putting it off until spring. Early-pruned trees develop their buds better than those pruned late in the season. These remarks refer to trees—not vines. (The later vines are pruned in the season the better in the Stanthorpe district, as the late-pruned vines stand a better chance of escaping injury by late spring frosts.) All worthless, badly-diseased, or worn-out trees which are no longer profitable, and which are not worth working over, should be taken out and burnt, as they are both valueless and a harbour for pests.

Land intended for new orchards should be got ready at once. The preparation of the land should be thorough. All stumps and roots should be removed to a depth sufficient to ensure their not impeding cultivation. The preliminary cultivation should consist of a light ploughing of a depth sufficient to turn the weeds or grasses so that their roots are exposed, followed by cross-ploughing and harrowing, whereby light roots, &c., are collected and removed. When perennial weeds, of which couch grass is a fair sample, are eliminated, the land should be ploughed and cross-ploughed as deeply as possible, and the soil reduced to a fine tilth. Where subsoiling can be practised, it is a decided advantage in admitting root penetration and conservation of moisture.

Farm Notes

JULY.

WHEAT sowings can now be finalised in Darling Downs districts where seasonal conditions may have delayed operations owing to unsatisfactory soil moisture. Early-maturing varieties, such as Florence, Novo, and Seaspray are very suitable for late sowing, while the popular medium-early varieties Flora, Three Seas, and Pusa, may also be sown with every chance of success.

Stock should be removed from early-sown wheat subjected to grazing by the end of the month, if a satisfactory yield of grain is desired.

Canary seed, which has proved suitable for the black basaltic Downs soils, may be sown during July, drilling in approximately 15 lb. sound seed per acre. Although usually harvested for seed, the crop will make excellent hay or provide useful grazing.

Potato planting will be commencing on lands east of the Main Range where late frosts are not a deterrent. Cut sets may be used, dusting the cut surfaces with wood ashes or slaked lime shortly after cutting, but whole seed not less than 2 oz. in weight is to be preferred.

Seed-bourne disease can be prevented by treating with either hot formalin or with corrosive sublimate, as advised in a leaflet issued by this Department.

Old potato lands deficient in humus can be made more productive by ploughing in green manure crops, and the application of suitable fertilizers when planting.

Following the harvesting of late maize, old stalks should be ploughed in and allowed to rot. All headlands will be improved by clearing up weeds and rubbish, preferably with a good fire.

Mangolds, swede turnips, and similar root crops which are making satisfactory growth, should be thinned out to suitable distances apart in order to encourage full development, while the necessary inter-row cultivation should not be overlooked. The root system of autumn-sown lucerne should now be well established, and will be strengthened by an early mowing if fair top growth has been made.

Any infestation of weeds during the spring can be kept in check by frequent mowing without regard to the quantity of hay secured. When fully established, cuttings can be regulated to coincide with the commencement of flowering.

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QUEENSLAND SHOW DATES, 1939.

June.

Biloela	1st and 2nd
Lowood	2nd and 3rd
Childers	5th and 6th
Boonah	7th and 8th
Bundaberg	8th to 10th
Wowan—	
Show	8th and 9th
Rodeo	10th
Gin Gin	12th and 13th
Gladstone	15th and 16th
Rockhampton	20th to 24th
Toogoolawah	23rd and 24th
Mackay	26th to 29th
Kilcoy	30th June and 1st July
Proserpine	30th June and 1st July

July.

Bowen	5th and 6th
Ayr	7th and 8th
Cleveland	7th and 8th
Esk Show and Campdraft	7th and 8th
Townsville	10th to 13th
Nambour	13th to 15th
Rosewood	14th and 15th
Charters Towers	18th to 20th
Laidley	19th and 20th
Maleny	20th and 21st
Innisfail	20th to 22nd
Cairns	25th to 27th
Gatton	25th to 27th
Caboolture	28th and 29th
Tully	28th and 29th

August.

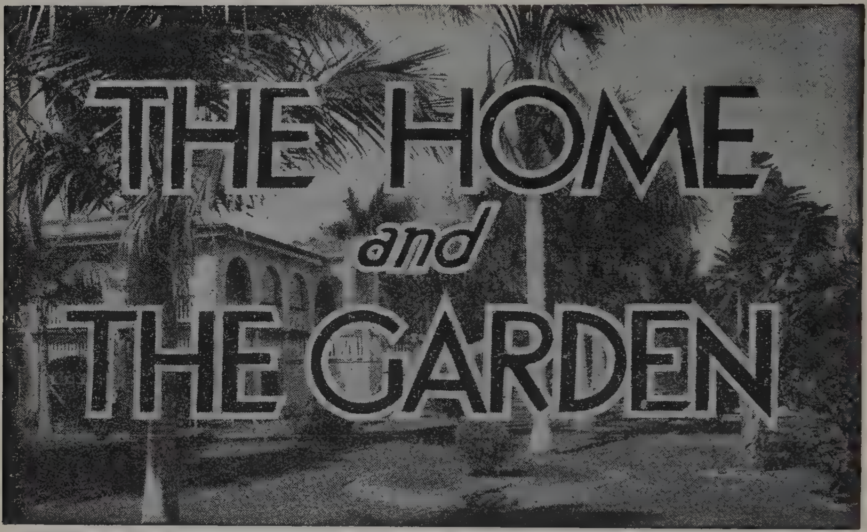
Atherton	1st and 2nd
Crow's Nest	2nd and 3rd
Pine Rivers	4th and 5th
Home Hill	4th and 5th
Ingham	4th and 5th
Royal National, Brisbane	14th to 19th
Jericho	25th and 26th

September.

Imbil	1st and 2nd
Canungra	2nd
Pomona	8th and 9th
Rocklea	9th
Mount Tamborine	9th
Beenleigh	22nd and 23rd
Malanda	27th and 28th
Southport	30th
Ithaca	30th

October.

Nerang	6th and 7th



Our Babies.

Under this heading a series of short articles, by the Medical and Nursing Staffs of the Queensland Baby Clinics, dealing with the care and general welfare of babies has been planned in the hope of maintaining their health, increasing their happiness, and decreasing the number of avoidable deaths.

THE CHILD FROM TWO TO FIVE YEARS.

Periodic Examinations.

MANY mothers who are prepared to be advised by their Clinic nurse and to exercise great care in regard to feeding, handling, and general management and care in avoiding infections during the first year of baby's life, relax their efforts during the second and succeeding years. Although the first year is very important because the foundations of baby's future progress are being laid, it is important that every mother should attend the Clinic with her child until he has reached school age. While the earliest and most urgent work of our Baby Clinics and Child Welfare Centres is naturally concerned with the first year, a very important part of our work is that associated with the care and welfare of the pre-school child or toddler. There occur many cases of badly-fed and poorly nourished children whose mothers have not realised that toddlers require knowledge, care, and skill in their management and in the building up of strong, healthy bodies.

Every toddler should be brought to the Clinic for examination at least once, but preferably twice, a year, and should be taken to his dentist once every six months. By doing this and not waiting until something is wrong, the child comes to regard his doctor and his dentist as his friends and he is not afraid of them when something is required to be done. The Clinic nurse with whom both mother and child will have become familiar will be able to give advice regarding the planning of a balanced diet and to suggest methods of management whereby health can be preserved. Behaviour which may be the prelude to the formation of bad habits, physical defects which may limit chest expansion, diminish the intake of fresh air and lead to faulty posture and poor resistance to disease, may be recognised at a time when correction is relatively simple.

Co-operation.

If the parents, by intelligent handling and sympathetic understanding in the early years, have gained the confidence of their child, co-operation between him and those concerned with keeping him fit will be readily established and problems associated with his upbringing later will be more easily solved.

Achieving Independence.

As the child develops, the more primitive activities of sucking and grasping become replaced by the more complex and co-ordinated movements associated with mastication, sitting, crawling, standing, walking, running, and talking, and later by other activities requiring greater skill. The exercise of these activities is important in enabling the child to adjust himself to his surroundings in his efforts to achieve greater independence. After the parents have provided a suitable playroom or playground and material, they should allow the child free scope for his activities. While they may be interested onlookers, they should not interfere with his play. At the same time they should be ready to respond when an appeal from the child indicates that he is in need of help or guidance.

Toys.

Simple toys such as blocks of wood often provide more pleasure to children than the most elaborate mechanical ones. Generally speaking, the younger the child the larger should be the toy. Among other considerations the fact must not be overlooked that a child of two years and older puts into his mouth things which may be accidentally swallowed or find their way into his air passages. Toys with rough or sharp edges and balloons attached to pointed sticks, should be avoided. Provide toys which can be washed. Apart from their value in providing means of teaching the child cleanliness, washable toys are more hygienic than those which are not. Once having decided upon a suitable toy and handed it over, the parent should regard it as the child's property to be treated as he chooses. He should be allowed to learn by experience what treatment the toy requires. In any case, a broken toy may be just as precious to him as one which is whole. The child must value and be interested in his toy if it is to have the desired effect of amusing him.

At an earlier age when sight, hearing, and feeling played so important a part in the child's development, coloured toys or toys capable of making a noise or those from which he could derive pleasure from handling, were suitable.

Playmates.

By the time he has reached the age of two years he is beginning to show an interest in other children and to join in games with them. He will harness up his playmate and play horses, he will throw a ball to another child. He likes toys to which he can impart motion such as wooden trains or engines, wheelbarrows or carts. He tries to hit a ball with a racket or bat. The small girl loves her doll which she dresses and undresses. Companionship with children of his own age is important in the development of the child.

Gaining Confidence.

Soon after a child begins to walk, he shows an interest in going up and down stairs. How often a mother is alarmed to find her small child engaging in activities which to her seem most hazardous. In reality it is seldom that he comes to serious harm. It is in this way that he gains experience and confidence. If he has been allowed to develop without unnecessary thwarting of his activities, the child, by the time he is two years old, has learnt to do many things which require more or less skill. Encourage him in his attempts to undertake new tasks. Do not allow him to be discouraged by failure, but be ready to give him unobtrusively just that little extra assistance which he may require in order to reach his objective, allowing him to experience the joy of achievement when it is possible.

Reference to the value of the nursery school and kindergarten in the development of the child of pre-school age has been made in a previous article.

You may obtain information on all matters concerning infant and child welfare by visiting the nearest Clinic, or by writing to the Sister in Charge, or by communicating direct with the Baby Clinic and Child Welfare Training Centre, Alfred street, Valley, N.1, Brisbane.

IN THE FARM KITCHEN.

SOUPS.

AT the end of a cold day there is nothing more cheery than a bowl of soup, tasty and piping hot. Here are a few hints and recipes:—The best base for soup is lean and uncooked meat in the proportion of a pound to a quart of water. Meat bones well broken up and added lend a very delicate flavour. A combination of meats, such as beef, mutton, veal, and ham-bones, will make a higher-flavoured soup than any one meat. It is well to remember that it is the meat and bones from the legs that are rich in gelatine, and these should be purchased in preference to all others for soup making. Soup should have merely the flavour of salt, and there should be in it the warm tone which the judicious use of pepper gives. Other flavourings are sage, thyme, mint, parsley, bay leaves, mace, cloves, celery seed, and onions.

Ten-minute Soup.

Take 2 oz. butter, 2 oz. flour, 2½ pints milk and water or milk and white stock, 3 or 4 tablespoonfuls tomato ketchup, seasoning.

Melt the butter, add the flour, and mix them until well blended. Stir in the milk and water or stock and stir until the soup boils and thickens. Let it boil gently for a few minutes, then add tomato ketchup and seasoning to taste. If liked, a few drops of cochineal may be added to improve the colour of the soup. If too thick, thin the soup down with a little more liquid. This makes an excellent emergency soup.

Vegetarian Tomato Soup.

Take 2 lb. tomatoes, 2 pints water, 1 oz. butter, a few celery seeds or a small piece of celery, 1 carrot, 2 onions, cornflour, salt and pepper, sugar, 1 clove garlic.

Prepare the carrot and onion and cut them in slices. Melt the butter and cook the vegetables in it for a few minutes without letting them brown, then draw the pan aside and add the tomatoes cut in slices, the water, garlic, and celery. If using celery seeds tie them in muslin. Cook the vegetables until tender, then remove the garlic and celery seeds, and rub the soup through a sieve. Return it to the pan, season with salt and pepper, and a little sugar if liked, and thicken it with a spoonful of cornflour mixed to a smooth paste with cold water. Boil the soup for a few minutes and serve it with croutons.

Mulligatawny Soup.

Take 1½ lb. scrag of mutton, 3 pints cold water, about 1½ oz. dripping, 2 carrots, 2 onions, 2 small apples, a few mixed herbs, a small piece lemon, 3 dessertspoonfuls flour, 2 teaspoonfuls curry powder, 2 or 3 dessertspoonfuls rice, seasoning.

Scrape, wash, and slice the carrots. Peel and slice the onions. Peel and quarter the apples and remove the core. Melt the dripping in a saucepan, add the carrot, onion, and apple, and fry until lightly browned. Stir in the flour and curry powder and fry again for a few minutes, then draw aside. Cut the mutton into small joints and add to the vegetables, with the water, herbs—tied in muslin—and seasoning to taste. Bring all slowly to the boil, remove the scum, and simmer for about two and a-half hours. Take out the meat and herbs and rub the soup through a sieve. Skim off any fat from the top, then reheat the soup. Squeeze in a little lemon juice and serve. Have ready the boiled rice and serve separately. If necessary, add a few drops of browning to the soup just before serving.

To prepare the rice, wash it well. Put it into a saucepan of boiling water, with a little salt added, and boil until tender—it will take about fifteen minutes. When cooked, strain it through a colander, pour cold water through it to separate the grains, then place on a dish in a warm oven to dry, and reheat.

Hasty Soup.

Take 1 small vegetable marrow, a dust of nutmeg, a pint of milk, 1 quart water, 1 oz. butter, salt and pepper to taste, 1 tablespoonful flour.

Peel and cut up the marrow, put it in a pan with the butter, water, nutmeg, and one teaspoonful of salt, and some pepper. Cover the pan and simmer for about an hour. Then rub the marrow through a sieve. Return to the pan, add the milk and the flour, smoothly mixed, and boil up. A little cream is a great improvement.

American Soup.

Take 1 lb. neck mutton, ¾ lb. peas (fresh, dried, or split), ¾ lb. tomatoes (fresh or tinned), 1 onion, 1 carrot, 1 turnip, saltspoonful of sugar, a little celery, pepper, salt, 2½ quarts water.

Soak the peas and put them in a pan with the mutton and water. Boil up, then add onion, carrot, turnip, and celery, cut into small pieces, and the sugar. Boil slowly for two hours, then add the tomatoes, also cut up small, and boil for half an hour longer. Take out the meat and put the soup through a fine sieve. Return it to the saucepan, add the pepper and salt, and serve with small squares of fried or toasted bread.

Cream of Carrot Soup.

Take 2 cupfuls cooked carrots, 2 tablespoonfuls butter, ½ cupful fine breadcrumbs, 1 cupful evaporated milk, 1 quart stock, 1 medium onion, pepper, 1 teaspoonful salt, sugar to taste.

Cook the onion in butter for five minutes, without letting it brown. Add crumbs, stock, salt, pepper, and sugar, and simmer for twenty minutes. Then stir in the carrots and evaporated milk. Reheat and serve at once.

PUDDINGS, PANCAKES, AND FRITTERS.

A batter, as the word implies, has to be well beaten, since the beating introduces air, which expands when heated, and so makes the mixture rise. All batters should be allowed to stand for at least one hour before they are cooked. The egg is a very important ingredient in a batter pudding. Do not economise too much in the quantity of eggs. It is better to use half milk and half water than too little egg. If it is necessary to use less egg, then make the batter slightly thicker. There is no need to whisk the egg before adding it to the flour, as it gets well beaten afterwards. The mixing of a batter is also important. An even consistency—similar to that of a thick sauce—should be maintained during the whole process of mixing.

Batter Pudding (Baked).

Take 1 egg, ¼ lb. flour, pinch of salt, ½ pint milk, dripping.

Sieve the flour and salt, put them into a basin, and make a well in the centre. Break the egg into a cup, pour it into the well, and mix with a small quantity of flour until a smooth paste is formed. Then take half the milk, and add it gradually, mixing in the flour by degrees. When it is all mixed and free from lumps, before adding the other half of the milk, beat the batter for a few minutes. Then stir in the remainder of the milk and leave the batter to stand for about an hour or longer. Melt about 1 oz. of dripping in a small baking tin or pie dish, and, when hot, pour in the batter. Put into a fairly hot oven to bake. It will take about forty-five minutes. Serve at once.

Batter Pudding (Steamed).

Take 4 oz. flour, ½ pint milk, 1 oz. castor sugar, 2 eggs, pinch salt.

Sieve the flour and salt into a basin, make a hole in the centre, break in the eggs and beat till smooth, adding the sugar, then the milk, by degrees. Beat well while doing so, and let the mixture stand for half an hour. It must be perfectly smooth and free from lumps. Put mixture into a greased mould, cover with a well-scalded and floured cloth. Steam for one and a-half hours. Turn out and serve with golden syrup.

Batter Cakes.

Take ½ lb. flour, pinch of salt, 1 teaspoonful of cream of tartar, ¼ level dessertspoonful of carbonate of soda, 2 dessertspoonfuls castor sugar, 1¾ gills of milk, 2 eggs, lard, jam.

Sieve together the flour, salt, soda, and cream of tartar, and add the sugar. Whisk up the eggs, pour them into the centre, and mix to a smooth, thick batter, adding the milk gradually. Beat well for a few minutes, then let stand for one hour or longer. Melt some lard in a frying pan and, when hot, put the batter into it, allowing a small tablespoonful for each cake. About four of these can be fried at a time. Fry until a golden brown, keeping them well basted with fat, and then turn over. When both sides are brown, lift out and drain on paper. Spread with hot jam, sandwich two together, and dredge with castor sugar. Serve immediately for afternoon tea.

Nut Fruit Batter.

Take 4 oz. of seedless raisins, 1 oz. almonds, 2 eggs, ½ lb. flour, 1 pint milk, pinch of salt.

Sieve the flour and salt into a basin. Make a well in the centre and pour in the eggs. Mix these with some of the flour, then take half the milk and add gradually. Mix to a smooth batter. Beat well, then stir in the remainder of the milk and leave the batter to stand as long as possible before cooking. When ready to bake, stir in the raisins and the blanched and cut up almonds. Turn into a greased fireproof dish and bake for about one hour. Serve with castor sugar.

Batter Souffle Pancakes.

Take ¼ lb. of flour, 1½ gills milk, 1 egg, 1 extra egg-white, castor sugar, pinch of salt, lard, cream, raspberry jam.

Sift the flour and salt into a basin. Separate the egg and pour the yolk into the centre of the flour, then take 1 gill of milk and add this gradually until all is mixed to a smooth batter. Beat it well, then stir in the remainder of the milk and let the batter stand before using. When ready to fry the pancakes, whisk the two egg-whites to a stiff froth and fold them lightly into the batter. Melt a good-sized piece of lard in a frying pan, and when a faint blue smoke rises from it pour in sufficient batter to coat the bottom of the pan (owing to the texture of the mixture, these will be somewhat thicker than the ordinary pancake). Fry each pancake gently, till golden brown, turn on to the other side and brown it, using a knife with a rounded blade. Turn each pancake out when cooked and spread it with filling, then fold it lightly in half, dredge with castor sugar, and serve as quickly as possible.

To prepare the filling, whisk the cream until it hangs from the whisk, then stir in an equal amount of raspberry jam.

Banana Fritters.

Take 3 or 4 bananas, juice of ½ lemon, castor sugar, deep frying fat.

For the frying batter: Take 2 oz. flour, ½ gill of water, ½ tablespoonful salad oil, 1 egg-white.

Cut the bananas in half, lengthways, and sprinkle them with lemon juice. Make a smooth batter with the flour, oil, and water, and let it stand for an hour, if possible. Add the stiffly-beaten egg-white just before frying. Coat each slice of banana by dipping it in the batter. Put it carefully into smoking hot fat and fry a golden brown, turning it over when brown on one side. After frying the fritters for about three minutes, drain them on paper. Sprinkle with castor sugar and serve very hot.

For apple fritters, core and peel the apples and cut them in rings.

For orange fritters, remove all the white pith and separate the orange into sections.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF APRIL IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING 1939 AND 1938, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	April.	No. of years' records.	April, 1939.	April, 1938.
North Coast.	In.		In.	In.
Atherton	4·15	38	3·87	0·79
Cairns	11·10	57	10·09	1·12
Cardwell	8·62	67	7·70	0·12
Cooktown	8·65	63	15·67	1·38
Herberton	3·71	53	2·78	0·47
Ingham	7·33	47	15·40	0·43
Innisfail	19·65	58	22·98	2·41
Mossman Mill	7·82	26	13·69	0·62
Townsville	3·28	68	1·75	0·09
Central Coast.				
Ayr	2·41	52	0·24	..
Bowen	2·64	68	1·54	0·76
Charters Towers	1·46	57	2·36	0·13
Mackay P.O.	6·02	68	9·81	0·40
Mackay Sugar Experiment Station	4·52	42	9·37	0·05
Proserpine	5·51	36	11·26	0·04
St. Lawrence	2·73	68	2·45	0·62
South Coast.				
Biggenden	2·15	40	3·31	2·15
Bundaberg	3·26	56	3·27	3·06
Brisbane	3·75	87	4·47	1·01
Caboolture	4·45	52	5·91	1·60
Childers	2·85	44	3·99	4·10
Crohamhurst	6·59	46	9·20	0·98
Esk	2·97	52	3·59	1·19
South Coast—contd.	In.		In.	In.
Gatton College	1·89	40	..	1·41
Gayndah	1·47	68	3·38	2·92
Gympie	3·42	69	4·35	1·01
Kilkivan	2·24	60	3·21	0·77
Maryborough	3·85	68	3·16	3·00
Nambour	6·09	43	8·27	1·02
Nanango	1·93	57	3·60	0·73
Rockhampton	2·55	68	1·77	3·37
Woodford	4·59	52	5·29	1·45
Central Highlands.				
Clermont	1·56	68	2·94	0·34
Gindie	1·13	40	..	0·62
Springsure	1·51	70	2·26	0·46
Darling Downs.				
Dalby	1·39	69	3·03	0·60
Emu Vale	1·38	43	1·86	0·81
Hermitage	1·36	33	..	0·12
Jimbour	1·37	51	3·16	1·05
Miles	1·46	54	2·47	2·05
Stanthorpe	1·75	66	2·87	0·24
Toowoomba	2·60	67	3·50	1·41
Warwick	1·64	74	3·00	1·10
Maranoa.				
Bungeworgorai	1·09	25	..	0·50
Roma	1·27	65	2·16	..

A. S. RICHARDS, Divisional Meteorologist.

CLIMATOLOGICAL TABLE—APRIL, 1939.

COMPILED FROM TELEGRAPHIC REPORTS.

Districts and Stations.	Mean Atmospheric Pressure, at 9 a.m.	Shade Temperature.						Rainfall.	
		Means.		Extremes.					
		Max.	Min.	Max.	Date.	Min.	Date.	Total.	Wet Days.
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	29·87	85	71	95	3	65	29	1,567	21
Herberton	..	74	63	81	3, 18	49	20	278	22
Rockhampton	30·02	82	65	87	6	55	27	177	14
Brisbane	30·11	76	62	81	30	55	27	447	18
Darling Downs.									
Dalby	30·11	76	55	86	1	39	27	303	7
Stanthorpe	..	69	50	75	2, 15	33	26, 27, 28	287	14
Toowoomba	..	70	55	76	3	40	27	350	19
Mid-Interior.									
Georgetown	29·90	89	67	95	7, 14	58	20	348	3
Longreach	29·99	85	62	95	2	48	28	197	9
Mitchell	30·08	77	56	87	2, 4	38	28	226	6
Western.									
Burketown	29·91	90	70	95	3	57	20, 21	51	3
Boulia	30·00	89	64	97	5, 6, 7, 8	50	20, 30	58	3
Thargomindah	30·04	80	60	91	7, 9	46	27	316	5

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	June, 1939.		July, 1939.		MOONRISE. June, 1939.	July, 1939.
	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					p.m.	p.m.
1	6·36	5 3	6·46	5·6	4·28	4·53
2	6·36	5·3	6·46	5·7	5·16	5·48
3	6·37	5 3	6·46	5·7	6·8	6·39
4	6·37	5·3	6·46	5·8	7·0	7·32
5	6·38	5·3	6·45	5·8	7·55	8·21
6	6·38	5·3	6·45	5·9	8·48	9·14
7	6·39	5·3	6·45	5·9	9·39	10·4[illegible]
8	6·39	5·3	6·45	5·9	10·32	10·56
9	6·40	5·2	6·44	5·10	11·20	11·47
10	6·40	5·2	6·44	5·10	a.m.	..
						a.m.
11	6·40	5 2	6·44	5·11	12·15	12·42
12	6 41	5·2	6·43	5·11	1 6	1·36
13	6·41	5·2	6·43	5·12	1·57	2·36
14	6·41	5·2	6·43	5·12	2·46	3·34
15	6·42	5·2	6·42	5·13	3·52	4·37
16	6·42	5·2	6·42	5·13	4·53	5·34
17	6·42	5·3	6·42	5·13	5·51	6·29
18	6·42	5·3	6·41	5·14	6 52	7·20
19	6·43	5·3	6·41	5·14	7 52	8·7
20	6·43	5·3	6·41	5·15	8·42	8·52
21	6·43	5·3	6·40	5·15	9 ·31	9·35
22	6·43	5·3	6·40	5·16	10·14	10·16
23	6·44	5·4	6·40	5·16	10·55	10·57
24	6·44	5·4	6·39	5·16	11·36	11·40
					p.m.	p.m.
25	6·44	5·4	6·39	5·17	12·16	12·24
26	6·44	5·5	6·38	5·17	12·57	1·11
27	6 44	5·5	6·38	5·18	1·39	2·0
28	6·45	5·5	6·37	5·18	2·24	2·52
29	6·45	5·6	6·37	5·19	3·12	3·41
30	6·45	5·6	6·36	5·19	4·3	4·34
31			6·36	5.20		5·26

Phases of the Moon, Occultations, &c.

2nd June	○	Full Moon	1 11 p.m.
10th „	☾	Last Quarter	2 7 p.m.
17th „	●	New Moon	11 37 p.m.
24th „	☽	First Quarter	2 35 p.m.

Apogee, 8th June, at 9.0 a.m.
Perigee, 20th June, at 6.0 a.m.

On the 16th there will be a near approach of Venus and the Moon at 7 a.m. In New Zealand this will be an occultation, a rare occurrence. No other planet in this year will be passed over by the Moon.

Mercury rises at 6 a.m., 36 minutes before the Sun, and sets at 4.33 p.m., 30 minutes before the Sun, on the 1st; on the 15th it rises at 7.26 a.m., 44 minutes after the Sun, and sets at 5.38 p.m., 36 minutes after it.

Venus rises at 4.36 a.m., 2 hours before the Sun, and sets at 3.33 p.m., 1 hour 30 minutes before it, on the 1st; on the 15th it rises at 4.58 a.m., 1 hour 44 minutes before the Sun, and sets at 3.38 p.m., 1 hour 24 minutes before it.

Mars rises at 8.49 p.m. on the 1st, and sets at 10.24 a.m. on the 2nd; on the 15th it rises at 8.5 p.m., and sets at 9.41 a.m. on the 16th.

Jupiter rises at 1.31 a.m. and sets at 1.34 p.m. on the 1st; on the 15th it rises at 12.45 a.m. and sets at 12.45 p.m.

Saturn rises at 3.19 a.m. and sets at 2.44 p.m. on the 1st; on the 15th it rises at 2.30 a.m. and sets at 1.52 p.m.

At our Winter Solstice, on the 22nd, the Sun will reach its furthest declination north, and for a short space will seem to halt in its course before we begin to notice its southward movement along the horizon. This seems to our eyes the simple truth, though we know that it is our planet Earth which has reached a turning point in its orbit; also that it is the fact of its yearly revolution around the Sun and, wonderful provision, of a tilt in its axis of rotation which accounts for all the phenomena of Nature from Solstice to Solstice.

In the Northern Hemisphere the Earth is in Perihelion, nearest the Sun, in its Winter. Here it is in Aphelion, furthest from the Sun, on the 5th of next month.

Mercury, in Cancer, has travelled through nearly four constellations since the middle of May. It will be an evening star and attain its greatest distance east of the Sun on the 13th of July.

1st July	○	Full Moon	4 16 p.m.
9th „	☾	Last Quarter	7 49 p.m.
17th „	●	New Moon	7 3 a.m.
23rd „	☽	First Quarter	9 34 p.m.

Perigee, 18th July, at 9.0 a.m.
Apogee, 5th July, at midnight.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S. add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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